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MAGAZINE

OCTOBER 30, 1990

THE INDEPENDENT GUIDE TO PERSONAL COMPUTING

VOLUME 9 NUMBER 18

MICRO CHANNEL ALTERNATIVES

PC Labs Tests 12

Compatible!
Only 2 Fail Our Tests

Expandable!
Yes, Even IBM

Fast!
ALR Tops the Pack at 33MHz

WIN 3.0 APPS

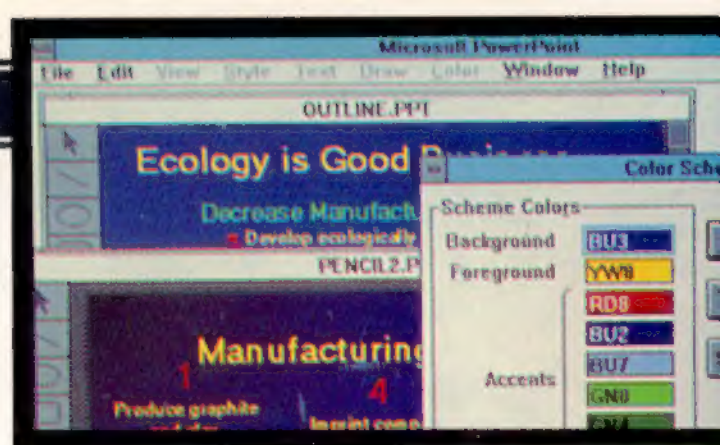
**DTP and Presentation
Power: PowerPoint
And Ventura Move to
Windows 3.0**

GRAPHICS

**OCR Comes of Age:
We Test 10 Software-
Only Packages for
Speed and Accuracy**

SOFTWARE

**Multitasking on a
Budget: 6 Low-Cost
Ways to Run Your
Old DOS Apps**



With Windows,
the future
takes shape.



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33-MHz, 80386, What Else Can



EISA... \$1995 We Say?



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Inside

First Looks is, by design, the news section of *PC Magazine*, containing only hands-on reviews of newly released products. As a result, while most of the magazine's editors spend their days talking about "filters" (the criteria that establish whether a product is included in a feature roundup) and "scripts" (the series of tasks that guide reviewers through the feature testing process), the First Looks staff spends its time discussing release dates and the number of weeks left before a product ships.

Unlike most news-gathering organizations, though, the First Looks staff is rarely caught by surprise. In order to publish timely and detailed reviews, the editors follow products closely through the last phases of their development. PC products are far too complex to be dissected and explained in a short time, so the editors maintain constant surveillance on manufacturers to make sure they know what's ready to emerge from research and development labs and understand a product's implications as soon as it is released in shrink-wrapped form.

As a result, the editors spend a lot of time asking questions about product development plans and seeing demos of unfinished products, all to better prepare them for those crucial days when the tests are made and the judgments formed on the finished product.



Supervising this process is a veteran of the magazine's own internal development over the years. Robin Raskin, now a senior editor, has been reviewing hardware and software since she took part in the first comprehensive single product roundup ever done by a computer magazine, the 1984 *PC Magazine* printer issue.

Raskin has a keen appreciation for our readers' need to find solid information, stemming from her first exposure

to computers on a Unix terminal that her husband installed in their home in 1982. She started to use the terminal to help with her free-lance writing career, but quickly recognized the limits of mainframe technology.

She discovered PCs soon after and began a career as a technical writer,



Running the First Looks section means that Robin Raskin spends a lot of time finding out what's going to be important down the road.

helping New York financial institutions improve the documentation on their internal applications.

Until recently, Raskin was a leader in the magazine's coverage of presentation graphics and an active member of the informal committee of frequent contributors who help shape the magazine. When the job of managing the First Looks section opened, it seemed natural for Raskin to "come in from the outside" and take a staff job. She was already well informed about developments in the industry and her own Rolodex was already fully developed.—Gus Venditto ■

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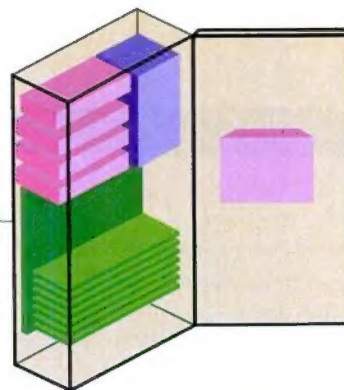
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AUSTIN 386/33

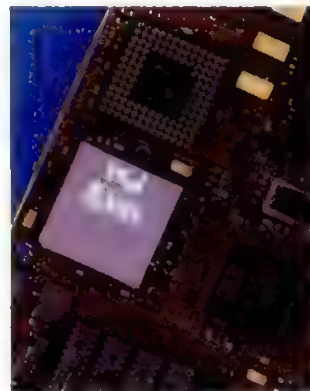
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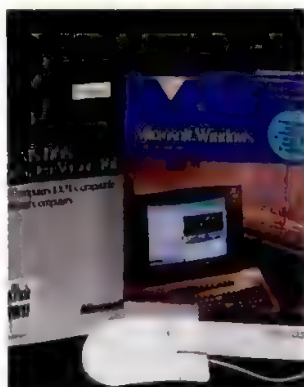
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RAM	2MB	2MB	1MB
Hard Drive	110MB	110MB	110MB
Small Footprint Chassis	Yes	No	No
On-Site Service	GE 1 yr	No	Xerox 1 yr
Price Difference	Best Value	29% Higher	42% Higher
Actual Price	\$3185	\$4099	\$4527

Source: PC Magazine 9/11/90

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COMPLETE 386/25 WITH VGA COLOR, 110MB HD, 2MB RAM ► \$2890

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AUSTIN 386/25

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- Microsoft Windows 3.0, MS-DOS 4.01 & Microsoft Mouse ► GE On-Site Service for 1 year ► All for only \$2890 or \$87 monthly.



YOU ALSO GET:

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- 80387 Math Coprocessor Socket
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- Compatible with DOS, OS/2, and Unix
- American-Made Motherboard
- Small Footprint Chassis
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AUSTIN 486/25

► EISA Bus Architecture ► 14" VGA Color Monitor ► Super-charged VGA Video Adapter ► 110MB Hard Drive with 32K Cache ► 4MB RAM (expands to 64MB on-board) ► Microsoft Windows 3.0, MS-DOS 4.01, & Microsoft Mouse ► GE On-Site Service for 1 year ► All for only \$5990 or \$180 monthly.

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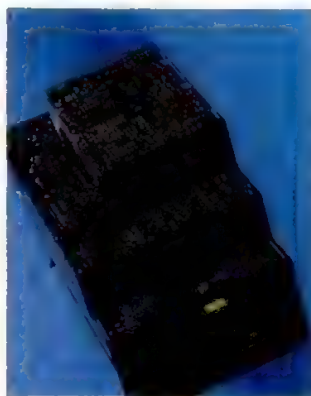
EISA board with ext. 64K cache, int. 8K cache and floating point unit.

AUSTIN 486/25 CHALLENGE

Comparison	Austin	Dell
System RAM	4MB	4MB
System Cache	► 64K	0
Hard Drive	175MB	► 190MB
Monitor	Super VGA Color 800x600	Super VGA Color 800x600
Video Adapter	► 1MB	256K
On-Site	GE	Xerox
DOS Windows 3.0 & Mouse	► Yes	No
Price	\$6489	\$7299

Source: PC Magazine 9/11/90

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AUSTIN 286/16 CHALLENGE

Comparison	Austin	PS 1
Processor	286 16	286 10
Speed	30% Faster	
RAM	1MB	640K
Floppy Drive	5.25" & or 3.5"	1-3.5" Only
On-Site Service	Yes	No
Expansion	7 Slots	3 Slots
Availability	Nation-wide	3 cities only
Price	\$1290	\$1699

Source: IBM PS/1 Press Release

Austin's 286/16 versus IBM PS/1... We beat every feature and cost less!



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COMPLETE 286/16 WITH VGA MONITOR, 40MB HD, 1MB RAM ► \$1290

Order the Austin 286/16 today, and your system comes to you ready to use right out of the box! Whether you choose the standard configuration or custom design your own system, this small chassis performs the big tasks at home as well as on the job.

Performing 30% faster than the IBM's newest PS1, the popularity of the 286/16 is attributed to its make up. Combining the speed of the 80286 16MHz micro-processor, the standard 40MB hard drive and DOS compatibility make this system perfect for personal and small business users. Run a gamut of software, including spreadsheets, database management and even games. Add peripherals to the seven expansion slots and upgrade memory as much as 8MB onboard, to eliminate the fear of system obsolescence.

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AUSTIN 286/16 OPTIONS	ADD
Upgrade to VGA Color Monitor	\$249
Upgrade to 2400 Baud Modem	\$149
Upgrade to Microsoft Windows 3.0, MS-DOS 4.01, and Microsoft Mouse	\$179

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COMPLETE 386/SX WITH VGA COLOR, 2MB RAM, 40MB HD ▶ \$2190

"The Austin 386/SX has it all . . . excellent support and attractive pricing . . . faster-than-average performance, quality components, expansion possibilities and a made in America philosophy . . ." Bruce Brown, PC Magazine Computer Consultant, Editor's Choice 1990.

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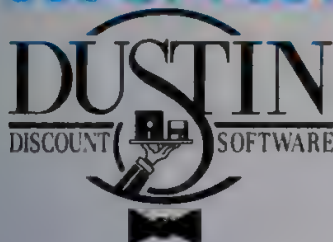
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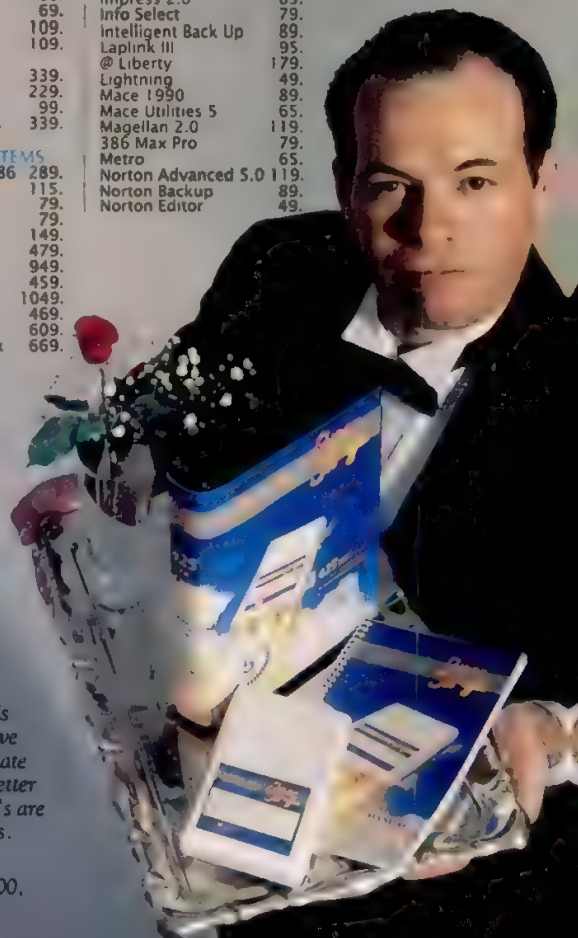
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Letters

MORE OF THE BEST

Many thanks for your fine article on "must-have utilities" ("The Ultimate Utility Shelf," June 26, 1990). As a confirmed hacker, I get many requests for recommendations. Your comprehensive listing and description is something I plan to pass along to any of my clients who ask about utility programs.

I was surprised to find no mention of *FAST!*, the disk cache program from Future Computer Systems of Salem, New Hampshire. While I have not tried every software cache program, I have had experience with most of the major ones, and in my opinion *FAST!* is the most efficient and flexible disk cache program, suitable for all levels of hardware and user expertise.

Bernard J. Gowen
New York, New York

Thank you for choosing *PKZIP/PKUNZIP* as one of the 33 best utilities. The article mentions that the *LHARC* self-extractor is more compact than *PKZIP*'s, 2K versus 10K, but the *LHARC* self-extractor has no features. The *PKSFX* type files support our Authenticity verification, password protection, extracting a file or a group of files, extracting files to other disk drives, printing the files, etc. *PKWARE* does offer a stripped-down version of *PKSFX*: 2,934 bytes, much smaller than the 10K reported in the article. This junior version of *PKSFX* is included with Version 1.1, which the article mentions is the version reviewed. The picture of *PKZIP* used for the article is Version 1.01, not Version 1.1.

We plan to release a menu-driven program that has all the features of *PKUNZIP*. We also have a program that compresses .EXE or .COM files smaller but still allows them to execute. Typical compression is 40 to 50 percent. We showed the beta versions of these programs at Spring Comdex and got rave reviews.

Douglas Hay
Software Developer
PKWARE Inc.
Glendale, Wisconsin



Our readers offer their personal selections for "The Ultimate Utility Shelf."

I was very surprised that you did not include *Headroom* by Helix Software (Version 2.02b) in your article about the 33 most indispensable DOS utilities. In terms of compatibility, ease of use, and usefulness, nothing else matches it. Without it, I struggled with a variety of alternative configurations for all my different applications. It works perfectly with all my TSRs to overcome MS-DOS's 640K memory limit.

Before I used it, I had no single configuration that did everything I wanted to do and was forced to reboot, mark, and release TSRs in a very cumbersome way. Please let others know what a great product it is.

Joel B. Singer
East Hills, New York

SOFTWARE UP IN FLAMES

This is in regard to Bill Machrone's July 1990 column. In the early 1980s, I met with a vice president of a company that might be called the Lotus of its time. (The company, of course, is long dead.)

The vice president told me, quite seriously, "If you wrap your Chevrolet around a tree you wouldn't expect General Motors

to buy you a new one. Why should you expect me to send you a new disk if it's destroyed in a fire or if you spill coffee on it?" (The company's major business product was, of course, copy protected.)

It seems that industry attitudes haven't changed much.

Barry D. Bayer
Homewood, Illinois

COMPUTING FOR THE VISUALLY IMPAIRED

I am writing concerning an article in the First Looks section (June 26, 1990). While well intentioned, the article was misleading and uninformed. The Premier 210 does offer some interesting features, namely the ability to repeat error messages using speech, and the ability to read text files, but these features in and of themselves do not make a computer usable by blind persons. Just repeating error messages or voicing files sent to the speech system is like having a limited audio printer. It would not make it possible for a blind person to interact in real time with a computer or application program. Once the voiced data has gone by, it's gone. Such features are provided by memory-resident programs called screen review programs. One such program is *Provox*, which my company, Kansys, writes and sells.

According to the National Federation of the Blind—a 50,000-member nationwide organization of blind persons—the unemployment and underemployment rate for blind persons in this country is over 70 percent.

As a leading source of information about computers, you can do much to help dispel the myths and misconceptions that prevent blind persons from achieving widespread employment. Blind computer users could also benefit from having access to your magazine in a computer-readable form, such as in text files, on-disk.

The National Federation of the Blind operates a program in conjunction with the U.S. Department of Labor called Job

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David Andrews
Vice President
Sales and Marketing
Kansys Inc.
Albuquerque, New Mexico



The full text of *PC Magazine* is available on-line and on CD-ROMs through *Computer Library*, a database of articles from over 135 computer-related publications. For more information, call (212) 503-4400.—Ed



MISSING A FLOPPY?

In your First Looks article on Sharp's new PC-6220 (June 12, 1990) you draw a comparison with the Toshiba T1200XE. "Like the UltraLite and the larger Toshiba T1000XE and T1200XE, the PC-6220 sacrifices the convenience of a floppy drive . . ."

This caused me some concern; however, I quickly pulled out my T1200XE and was relieved to find that the floppy drive was still intact.

Matthew A. Miller
Somerdale, New Jersey



Whoops! We were half right. The Toshiba T1000XE does not have a floppy disk drive, but the T1200XE does.—Ed.



WON OVER BY WINDOWS

I have long disliked the GUI interface because of its hardware overhead. It seemed to be providing something that wasn't needed. Recently, I set out to purchase a multitasking environment for my 386 machine and was expecting to purchase a copy of *DESQview* and *QEMM*.

The helpful salesman at the discount software store called my attention to *Windows 3.0* which had come out the week before and hadn't yet been reviewed in *PC Magazine*. I told him I was leery but he offered to take *Windows* back if I didn't like it. He pointed out its memory management capabilities, its ability to run even old DOS programs in 386 mode, and said it would make me more productive. He was right on all counts and I haven't taken it back.

But one problem: it is such a rich environment and so new to an old DOS veteran like me that it's hard for me to get my

regular PC work done. I'm too busy exploring and learning *Windows 3.0*. It's a great product and Microsoft has finally got it almost perfect.

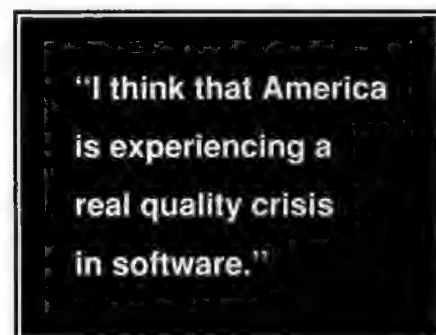
Robert Harmon
Evanston, Illinois



FAITHFUL REPRODUCTION

Your recent First Looks article (July 1990) introducing the *Monotype Typeface Library* included a misconception about Adobe's practices in reproducing PostScript fonts.

The article implies that the designs of our characters are modified to accommo-



date low-resolution printing. We would like to emphasize that it is *not* Adobe's policy to alter the character shapes of licensed typeface designs.

Before a new typeface package is released, our typographic staff painstakingly examines each character to make sure it is reproduced faithfully to the original design and that it will be rendered efficiently and optimally at all sizes and resolutions.

As Adobe cross-licenses Monotype designs in our own library, we anticipate that both companies will ship identical software. Any necessary "adjustments" will be the result of both companies' commitment to quality and to faithful electronic or digital reproduction of historical designs.

Kathy Englar
Product Marketing Manager, Fonts
Adobe Systems
Mountain View, California



SOFTWARE SLOP

I had to comment after reading John C. Dvorak's article on "The Software Slop Factor" (June 12, 1990). I am a poor software developer who, like most, is at the mercy of the big firms that develop the products I use. In the past few months, upgrades of popular software packages

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THE LEADER IN WINDOWS 3.0 GRAPHICS

Letters

have been so riddled with bugs that my applications no longer worked correctly. I think that America is experiencing a real quality crisis in software. New features and updates take precedence over making things work right.

The big companies cannot be trusted. Software developers need a lab similar to *Consumer Reports*. The products are tested by qualified personnel, and if no bugs are found, the company is given a certification number for use in their ads. Unless the certification is included, developers can be certain that the product is just a beta-test version.

If software can't do what it promises, it shouldn't be sold. If this type of cheap throw-it-together-and-hope-the-stupid-users-don't-find-the-bugs mentality continues, I want out of the business!

John Fleming
Oak Forest, Illinois

READING ISN'T FUNDAMENTAL
Having just received my *PC Magazine* utility disks in the mail, I decided to sit down and try out a few of the programs. To test PARSE (a program that analyzes the grade level of text) I created a file containing, "See the cat. See the cat run. Run cat, run." PARSE responded with a reading grade level of 5.3. That didn't seem right. Then a really frightening thought occurred to me . . .

Paul D. Cohen
Huntington Station, New York

MONITORING THE COSTS
Here is one for the "what's wrong with this picture" category:

If I had the money, I could buy:

- A fast 80MB hard drive, with controller, for about \$599.
- A name-brand 300-dot-per-inch laser printer for about \$995.
- A custom-built 386SX with hard drive for about \$1,200.

But, if I wanted to buy a nice 20-inch color monitor, I would have to pay about \$3,000.

So how about it NEC, Sony, Mitsubishi, Panasonic, and all the rest of you guys, let's get your best 20-inch monitors down to about \$899. (You could probably sell a million.)

Douglas L. Reed
Jacksonville, Florida

ARTS AND CRAFTS

Everyone's comments on Bill Machrone's March 13, 1990, column missed the boat. There's no doubt Bill is a doting father to his eight-year-old daughter. In the course of helping her with a cover design for her class stories, he employed a litany of high-end graphics.

In the process, he also helped stifle any creativity this project might have induced. Bill, however, is only a coconspirator. The teacher who suggested computer production should be brought to her school art room and informed that pencil, paint, and charcoal are instruments of art, not the mouse, 386, and laser printer.

But don't worry, Bill. When you're in your rocking chair, you won't have to look at your daughter's hand-drawn art work. For memories, you'll have clip art.

Brad Brush
Vancouver, British Columbia
Canada

CORRECTIONS & AMPLIFICATIONS

Current users of the Connect service (After Hours, June 26, 1990) can download versions of *PC/MacNET* software that runs under both protected and real modes of *Microsoft Windows 3.0*. The software is available at no extra cost above the standard download cost.

Pricing since January 1, 1990, is \$10 per hour peak, \$5 off-peak, with \$0.03 per 1,000 characters during peak hours (7 A.M. to 7 P.M.) and \$0.02 off-peak. The 9,600-bit-per-second access charges are \$14 per hour peak and \$7 per hour off-peak, with the same data transfer charges.

The address should read: Connect Inc., 10161 Bubb Rd., Cupertino, CA 95014.

In our Top Ten Sellers chart (Pipeline, July and August 1990 issues) we incorrectly referred to Delta Technology as Delta Technologies.

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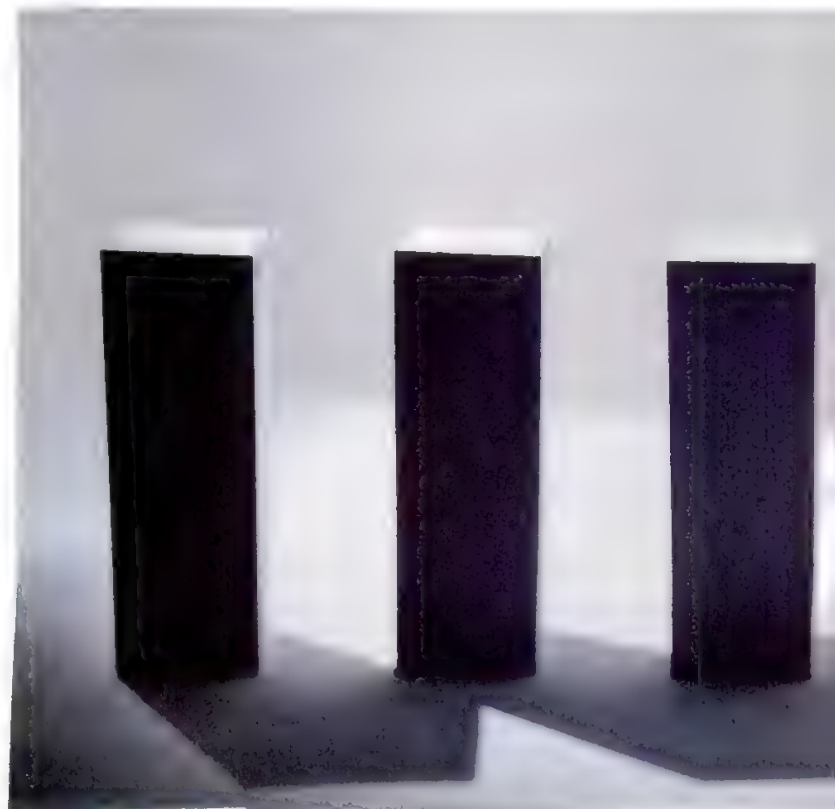
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Computers and Communications

all the resolutions you'll need.

Especially since the MultiSync 3D also has a microprocessor-based digital control system that provides automatic screen configuration, lets you select the ideal resolution for your software, and even has a



memory that recalls your preferred screen settings. And it's also compatible with the IBM PC/XT/AT, PS/2 and the Macintosh computer systems.

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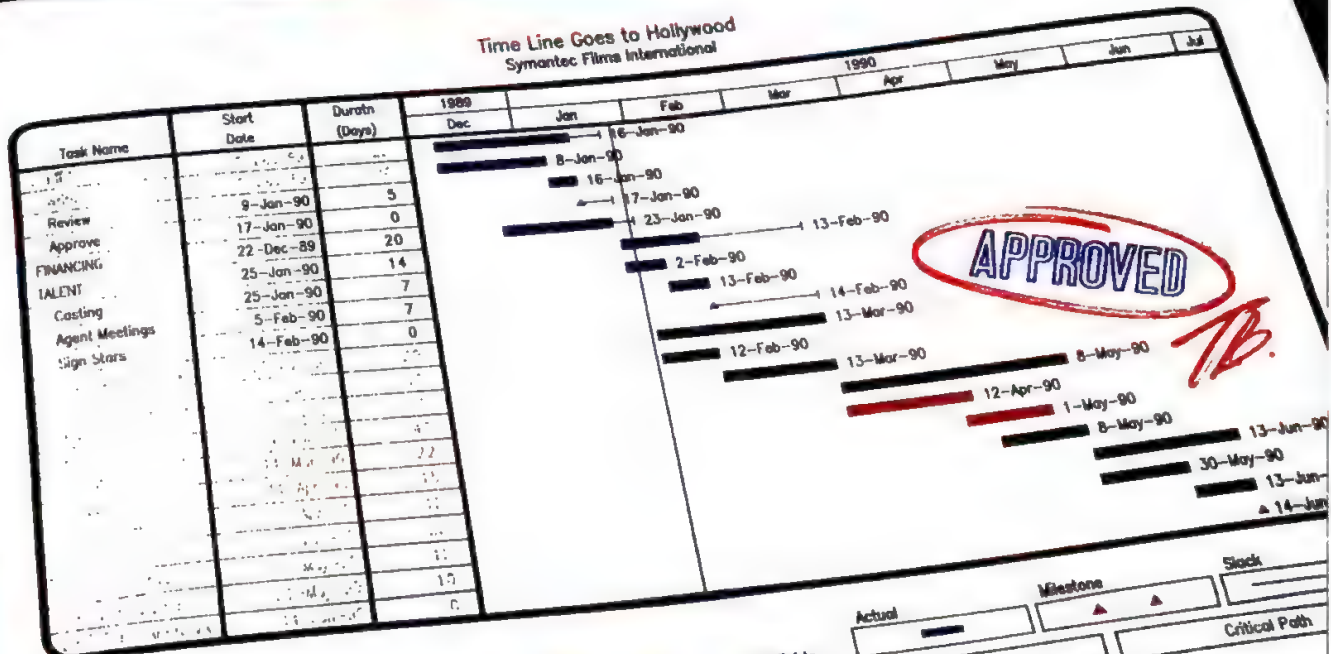
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by
Lori Grunin

Advisor

MORE PIXELS FOR THE PS/2

How can I upgrade the VGA video output of my IBM PS/2 computers to the new higher resolution standards?

Stephen Trokel
New York, New York



Unlike video boards for non-MCA machines, which have room for additional video memory, the built-in VGA on all PS/2 MCA systems has a fixed resolution and palette size. To upgrade this system would require additional video memory, different oscillators to drive a monitor at higher frequencies, and a completely different video controller chip. Unfortunately, none of these components are designed for upgrades. So, basically you are stuck with the built-in VGA output.

All is not lost, however. There are a number of higher resolution video adapters available for the MCA bus. IBM's 8514/A adapter with 512K of VRAM (part number 1887972; to find your nearest authorized IBM dealer, call (800) IBM-2468) provides 1,024-by-768 display resolution and 16 colors (256 colors with 1MB VRAM; Memory Expansion Kit part number 1887987; contact dealer for pricing information).

Some less expensive but 8514/A-compatible solutions include ALR's Enhanced Graphics Package (\$399 with 256K VRAM; Advanced Logic Research, 9401 Jeronimo, Irvine, CA 92718; (800) 444-4257, (714) 581-6770); Genoa Systems' SuperVGA Model 6600 (\$549 with 512K VRAM; 75 E. Trimble Rd., San Jose, CA 95131; (408) 432-9090; and the Paradise 8514/A Plus (\$999 with 512K VRAM; Western Digital Imaging, 800 E. Middlefield Rd., Mountain View, CA 94043; (800) 331-8127, (415) 960-3353). This is not a complete list, nor have we reviewed any of these boards other than IBM's. To get an idea of the capabilities of 1,024 by 768 video boards, take a look at "1024 Graphics Adapters" in the April 10, 1990, issue—do keep in mind, how-

- **MORE PIXELS FOR THE PS/2:** Upgrading a PS/2 from its on-board VGA.
- **COMPILING dBASE CODE:** Speeding up your dBASE applications with a compiler.
- **SPEAKING THE SAME FORMAT:** Converting among word processor file formats.

ever, that none of the boards we reviewed were PS/2 compatible.

Understand that any higher resolution display board you install will require another monitor capable of handling that higher resolution. The VGA monitor you currently use is a fixed frequency monitor not capable of handling display resolutions beyond VGA—VGA outputs at a horizontal scanning frequency of 31.5 kHz, while 8514/A outputs at 47.7 kHz. So when pricing display upgrades, be sure to factor in the cost of a new monitor as well as a new display adapter. In addition, remember that boards adhering to the 8514/A standard output interlaced video (every other horizontal scan line), and you will need a monitor that supports interlaced output. (For more information about compatible monitors, see "1024 Monitors" in the April 10, 1990, issue of *PC Magazine*.)

COMPILING dBASE CODE

I have an extensive number of programs that I have written using *dBASE III Plus*. Will buying a *dBASE* compiler and compiling these programs make them appreciably faster? If so, please suggest compilers that I should consider and various features I should look for.

Richard K. Larder
Oakland, California



The answer to your question is a resounding yes, compiling your *dBASE III Plus* code will make your programs run faster. When you use a compiler, the *dBASE* source language is converted into machine language executable programs that can run independently of *dBASE*. Not only will your programs run faster, but they will also use less memory to run.

By far, the most popular of these compilers is Nantucket Corp.'s *Clipper*. The current version available is from the Summer of '87 (\$695; 12555 W. Jefferson Blvd., Los Angeles, CA 90066; (213) 390-7923), although *Clipper 5.0* is slated to be shipped imminently. Also keep in mind, however, that *Clipper 5.0* was supposed to ship almost a year ago. Using *Clipper* you will be able to compile your code into executables, but this compiler does not support all of the interactive *dBASE* commands. But remember that there are other features available that you don't have in *dBASE*.

FoxBASE+ 2.1 (\$395; Fox Software, 118 W. South Boundary, Perrysburg, OH 43551; (419) 874-0162) also has compiler capabilities for *dBASE III Plus*, providing both interpreter and compiler versions of the language. It is known for its speed and, like *Clipper*, has *dBASE* programming language enhancements. There are also Macintosh and 386-specific versions available.

Bumblebee Software (4122 128th Ave. SE, #200, Bellevue, WA 98006; (206) 562-1157) has recently put together three great packages that work under DOS (*dBfast/Plus*, \$395), *Windows (dBfast/Windows*, \$395), or on the Macintosh (*dBfast/Mac*, \$395). *dBfast* is compatible with all the noninteractive commands in *dBASE III Plus* and it is additionally able to handle applications developed with *Clipper*.

Another recently updated product has an interesting twist. *Force 2.0* lets programmers turn *dBASE* applications into TSR programs. This \$695 product creates

Advisor

compact executable files from programs written in *dBASE*. It requires very structured programming, however; for example, it requires definitions of all procedures, functions, index files, field descriptions, and variables.

Other compilers with interesting options are *Quicksilver* (\$599; WordTech Systems Inc., 21 Altarinda, Orinda, CA 94563; (415) 254-0900), a compiler that adds scrolling text windows to the *dBASE* language; and Cykic Software Inc.'s *Multibase 3.0* (\$899 multiuser; 3944 Third Ave., San Diego, CA 92103; (619) 296-0182), which lets developers create applications that can access as much as 16MB of extended memory and has multiple-user capabilities.

SPEAKING THE SAME FORMAT

Our major word processor is *WordPerfect 5.0*. We are working with different professional groups that have their documents written in word processors like *Microsoft Word*, *WordStar*, *Volkswriter*, and *XyWrite*.

Is there a universal conversion program that can convert a document from any word processor to another with minimum change in formatting?

Truon Pho
Atlanta, Georgia



There are a few shareware and public domain utilities that do conversions from specific word processors to *WordPerfect*. *Xword* converts from *WordStar 2000* and *XyWrite*; it's available from the Conversion Library of the *WordPerfect* forum on CompuServe (GO WPSGA; there's a \$45 registration fee if you like the program). *VWTOWP*, from the same source, does *Volkswriter* to *Word-Perfect* conversions.

Among the universal conversion programs, *Software Bridge* (Systems Compatibility Corp., 401 N. Wabash, Chicago, IL 60611; (312) 379-0700) was the Editor's Choice when we tested text conversion programs in the April 25, 1989, issue. You can buy the basic package for conversion among 22 word processors (including all those you need) for \$199, or a more limited version for \$149.

Since that comparison, MasterSoft has

made a number of improvements to *Word for Word* that may make it a better choice for you. You should consider whether there are some more-esoteric formats that you may need to convert and then compare the two with your own list of formats before choosing. Among *Word for Word*'s newest formats are *Microsoft Excel 2.1* and *DEC DX* (\$149; MasterSoft, 6991 E. Camelback Rd., Scottsdale, AZ 86251; (602) 277-0900). One newcomer is *White Crane Systems' AutoWord* (\$150; 6400 Atlantic Blvd., #180, Norcross, GA 30071; (800) 344-6783, (404) 446-0660), which covers the major word processing formats as well as the most popular graphics and data file formats.

ASK THE ADVISOR

Advisor is a collaborative effort of the *PC Magazine* staff: Robert W. Kane, Wendy Dugas Pérez, and Gus Venditto contributed to this column. Send questions to Advisor, *PC Magazine*, One Park Avenue, New York, NY 10016, or upload them to PC MagNet (see page 8 for access information). Please specify your equipment. Unfortunately, individual replies are not possible. ■

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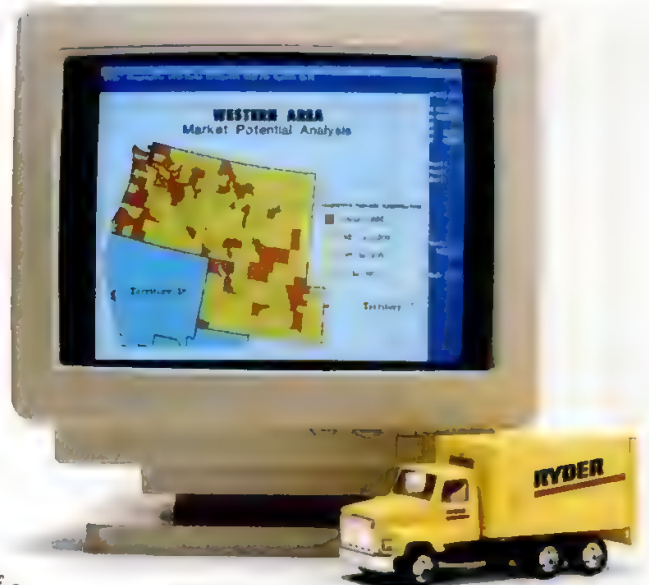
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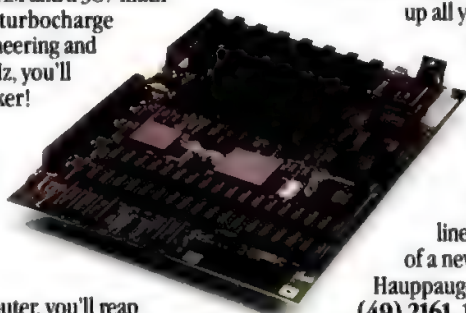
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CIRCLE 276 ON READER SERVICE CARD

First Looks

Hands-on Reviews of the Latest Products

Ventura Publisher Is Ported to Windows: New Flexibility and Surprising Speed

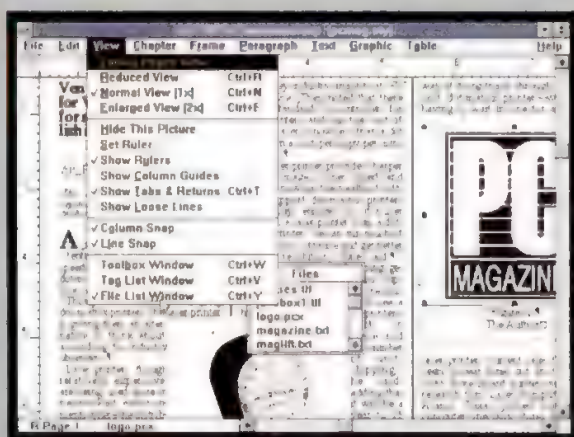
HANDS ON
by Edward Mendelson

Ventura Publisher: Windows Edition finally brings industrial-strength document preparation to the Windows environment. Version 3.0 of Xerox Corp.'s \$895 desktop publishing package—the first Windows version after two major versions for the GEM interface—adds virtually no new functions to Ventura 2.0 and to the *Professional Extension* and *Network Server* add-ons that have been available for the past two years. The major benefit comes from the added flexibility and ease of the Windows environment.

Xerox has also released a new GEM version, functionally equivalent to Version 2.0 with the addition of the *Professional Extension* and *Network Server* modules, for users who prefer the speed of GEM to the flexibility of Windows. (See sidebar.) Owners of any of the GEM versions, including the new one, can upgrade to the Windows version for \$195 until the end of the year.

Ventura always had more raw power than rival desktop publishing (DTP) packages, but it grew increasingly isolated as a result of the limited printer support and dearth of keyboard shortcuts of its GEM interface. Although the new version doesn't use all the conveniences possible under Windows 3.0, it does let you import ASCII text and line art via the Windows clipboard, and lets you use any printer or printer function supported by a Windows printer

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Ventura Publisher's Windows version lets you display any or all of the toolbox, file list, or tag list. The GEM version forces you to display either all or none.

NewWave 3.0: The Object-Oriented Metaphor Ripens with Age

HANDS ON
by William S. Hall

First introduced in the summer of 1989, Hewlett-Packard's **NewWave** is a graphical software environment that runs on top of Microsoft Windows. Like Windows, NewWave provides an icon-laden desktop, but brings a rich object-oriented metaphor to the PC user.

Originally hailed as an exciting and interesting GUI (First Looks, *PC Magazine*, October 17, 1989), this new version of the product improves on a good thing. Central to this latest version is what's called "full agent capability" and the ability to share objects on the network. In

addition, all of the benefits of the new Windows 3.0 environment, especially its memory management, are available to NewWave.

Rather than viewing the desktop as a collection of programs and files, NewWave's iconized desktop offers an integrated computing environment defined by objects and agents. Object management technology lets the user combine data and code into a single manipulable entity. Complex repetitive tasks can be automated and even scheduled using the **NewWave Agent**, a recorder-type feature, now provided with the basic package. And, although the greatest gains in productivity

come from using applications written especially for NewWave, there are benefits to using it with existing Windows and DOS applications.

At \$195 (a \$50 upgrade from the previous version), you'll probably feel the NewWave pinch more on your hard disk than on your pocketbook. NewWave requires roughly 10MB to hold its basic files, and a bit more to decompress the files during installation.

At the center of NewWave is the Office Window and its object orientation. It provides a view of everything available in the NewWave environment. At first glance, the Office Window

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First Looks

Ventura

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driver. New or existing *Ventura* files can be exchanged transparently between *Ventura*'s *GEM* and *Windows* versions.

Windows lets you switch quickly from *Ventura* to other applications where you can prepare text and graphics for import via *Ventura*'s import filters. In addition, *Ventura* under *Windows* adds keyboard shortcuts to almost every option on the menus—something frustratingly missing in the *GEM* version. Oddly, the *Windows* version doesn't let you press the initial letters of "Save" and "Abandon" when it makes you choose between them in its exit menus, but most other choices can be made without using the tab key or mouse.

Windows lets *Ventura* look better than *GEM* ever did. You can move the toolbox, tag list, and file list around the screen, and you can display the lists of tags and files at the same time. You don't have to endure *GEM*'s ugly monospaced screen font, although even under *Windows*, *Ventura*'s submenus still look more serviceable than elegant.

PageMaker continues to be the *Windows* DTP package of choice for advanced graphic design work, but *Ventura* takes a clear lead for large-scale publications and template-based designs like books and manuals. *Ventura* also allows you typographic flexibility unavailable with most other *Windows* packages. For example, you can print to one printer using the width tables designed for another. An upgrade to the new *Windows* or *GEM* versions will give you the functions that until now required the addition of the expensive *Professional Extension*. These functions include support for longer documents, tables, cross-referencing and replaceable variables, an equation editor, a hyphenation dictionary, and vertical centering. The old *Network Server* module is also incorporated, with support for Novell, 3Com, and

CLASSIC GEM VENTURA—FIGHT OR SWITCH?

If the *GEM* interface feels like home to you after using Version 2.0 of *Ventura Publisher*, you don't have to move to *Windows*. You can upgrade to the \$895 Version 3.0 of *GEM Ventura* for \$195, and get the features that used to come only with the \$595 *Professional Extension*.

If you already have the *Professional Extension*, an upgrade costs \$80 but gives you only a few new benefits: an advanced HPGL filter, some new filters, and footnotes that can flow from page to page. You also get a slightly better manual.

If you want better printer

support than you got in Version 2.0, you'll have to switch to *Windows*. The new *GEM* version doesn't even add support for the scalable fonts in the LaserJet III.

One advantage of the *GEM* version is its wide support by third-party vendors. Aristocad's *The Soft Kicker* gives you a virtual full-page monitor by letting you move anywhere on a page without using the scroll bars or waiting for the screen redraw. The same vendor's *VP to the Max* integrates a spell-checker, thesaurus, and search and replace directly into *Ventura*.

But similar products either

exist now, or will soon, for *Windows*. Aristocad already offers *The Soft Kicker Plus* for *Windows*. Chapter-management and style-management software like Aristocad's *VP Manager*, Metropex Digital's *Editor's Toolbox*, and SNA's *VPToolBox* will work equally well with the *Windows* and *GEM* versions of *Ventura* because files are fully compatible between versions.

Finally, if you're ready to leave *GEM*, but you don't care for *Windows*, wait until later in the year, when you'll be able to buy a Presentation Manager version of *Ventura* for \$895.—EM

IBM PC NET networks. The *Windows* version uses the Houghton-Mifflin hyphenation dictionary, which produces better results than the EDCO dictionary used in *GEM* versions.

Not everything is rosy in the *Windows* version. *Ventura* still doesn't give you an Undo command, which means that you are compelled to save often and sometimes revert to the version that you've saved to your disk. *Ventura*'s memory management seems a bit shaky, and I encountered occasional lockups, fortunately while loading instead of when editing.

Xerox also neglected to include a network installation manual because it wasn't ready on time. Experienced network administrators should have no trouble, but you have to remember to load *NetBIOS* on local hard disks before installing *Ventura*. *Ventura* uses *NetBIOS* to snoop out duplicate serial numbers in network copies of the software.

The question faced by anyone who considers a switch from the *GEM* version to the *Windows* version is speed. With *Ventura*, *Windows*' notorious overhead takes its toll, but in ways that you may be able to tolerate. On a 33-MHz 386 system with 7MB of expanded memory, Version 3.0 of *GEM Ventura* loaded in 4 seconds; on the same system, with its RAM

above 1MB configured as extended rather than expanded for use with *Windows* 3.0, the *Windows* version loaded in 6 seconds. *GEM* took 3 seconds to convert a 44K *WordPerfect* file; *Windows* took 6 seconds. A 70K ASCII file that took *GEM Ventura* 8 seconds to import took 13 seconds under *Windows*.

But *Windows* actually seems faster when changing formats. A change in body text style that took 2 seconds under *GEM* seemed almost instantaneous under *Windows*. Scrolling through a file seemed equally quick in either version.

Compared to *PageMaker*, the *Windows* version of *Ventura* was typically two to five times faster in importing files and navigating documents.

Ventura doesn't support Dynamic Data Exchange (DDE) links with other *Windows* applications. Possibly *Ventura*'s method of building up its documents from text files on disk makes DDE links more difficult to implement, but there's no inherent reason why a later version couldn't place a tag in a text file that could trigger a link to another application. *Ventura* also manages its fonts differently from other *Windows* applications, and still makes you merge width tables. The manual is unnecessarily obscure on the whole subject of width tables.

**FACT FILE**

Ventura Publisher: Windows Edition
Ventura Software Inc., 15175 Innovation Dr., San Diego, CA 92128; (800) 822-8221.
List Price: \$895, upgrade from earlier versions \$195 until December 31, 1990.
Requires: DOS 3.1 or later, *Windows* 3.0; 2MB RAM, with memory above 640K configured as extended.
In Short: The highest-powered DTP program for DOS now ported to *Windows*. Still no Undo command, but just about everything else. Speed is close to the *GEM* version.

CIRCLE 441 ON READER SERVICE CARD

Ventura can perform typographic miracles on large documents, but the manual, as in previous versions, is not the greatest recommendation for the program. The *Ventura*-generated manual has its share of format errors, with some especially glaring ones in the index. It also has wildly varying line spacing, plenty of misspellings, illustrations that don't illustrate the subject under discussion, and text that simply breaks off in the middle of a paragraph. I compared one particularly poor page in the *Windows* version to a corresponding page in the *GEM* version, and the *GEM* had far fewer mistakes. ■

First Looks

NewWave

CONTINUED FROM PAGE 33

appears to be just another graphical rendition of the MS-DOS file system. But it's vastly different from *Windows*. Using *Windows*, a task involves navigating through a file system to execute a program and then finding and loading a corresponding data file. By contrast, the principal items in the *NewWave Office* are objects where the program and data are linked as a single entity. A task—whether it's a document, a worksheet, or a graphic chart—is initiated by creating an object of the corresponding type.

Each object can be manipulated in a variety of ways by dragging it with the mouse and dropping it into another object or tool. Suppose, for example, you wish to create a word processing document, print it, and then store it. Starting with the Create a New . . . command in the Objects' menu, you might select a *NewWave Write* or *Amf* object. Once created, the object is then opened by double-clicking on it with the mouse. You enter and edit text in the usual way, and then close the object. To print, you drag the newly created object to the printer tool; when done, you can drop the object into the File Drawer to remove it from the desktop.

Another premier feature of

any graphical user interface is data exchange. Traditional *Windows* exchange is either via the clipboard or Dynamic Data Exchange (DDE). DDE in particular can be used to hotlink information in one file to another. DDE links require that the destination application have the intelligence (i.e., the code) to support a variety of data formats. Such capability is at the whim of the developer. Also, DDE has no way to know when information has changed once the connection is closed; if the spreadsheet data in the document is then modified, these are not reflected in the original file. Additionally, DDE links can be lost if the spreadsheet is moved to a different directory or renamed.

In *NewWave*, a compound document is created by dragging an object to another and dropping it there. The two objects do not have to know anything about each other. Furthermore, the same object can be contained in several places and the information always remains up to date even when container and containee are moved about. Because *NewWave* maintains the links, they are both dynamic and persistent.

An object contained within another can be modified by simply clicking the mouse on the object's graphic—so, for example, you can change your spreadsheet data from inside a word processing document. Called "drill down" editing,



Each *NewWave* icon represents an object where data and program can be treated as one entity.

the changes also radiate to all other places where the object is located. Compound objects can even be moved to floppy disks or shared on networks using *NewWave*'s object storage feature. The user doesn't need to remember the components nor manage the links among them. And, since objects can include video, sound, or animation, it is quite possible to create some multimedia items.

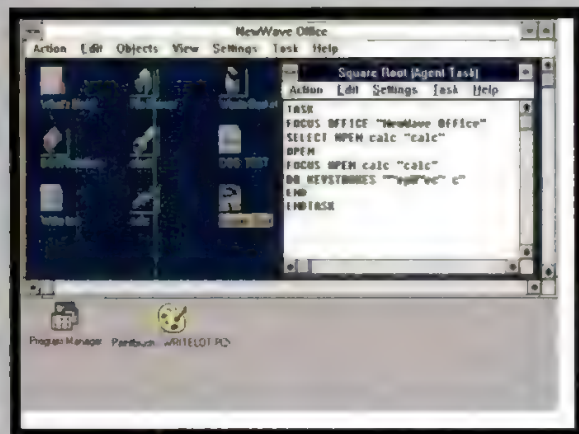
Finally, the Agent is a sophisticated, but easy-to-use facility for recording operations. As you enter a sequence of commands, they are recorded by the Agent, and each line is displayed in a window. When done, the series of actions can be edited, compiled, tested, and stored as a task. A task can be run by simply dragging it to the Agent tool. Tasks can also be scheduled for automatic operation and may contain prompting and conditional statements.

Thus, the Agent is more of a programming environment than a simple batch language. And the Agent task doesn't depend on the Desktop arrangement for its execution. If for some reason your task fails, you will be presented with a view of the Agent task with the offending line highlighted waiting to be edited and recompiled.

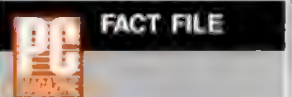
Three introductory tutorials that illustrate how to create an object will have you running *NewWave* in no time. You'll be able to direct your efforts toward learning applications, not

an underlying file structure. On the other hand, if you already know DOS and/or *Windows*, you may at first find yourself with all the wrong reflexes for using *NewWave* efficiently.

NewWave 3.0 is a major step toward achieving an object-oriented environment. But achieving its full potential hinges on the availability of an assortment of *NewWave*-specific software. Key software vendors, including Lotus, Samna Corp. (*Amf Professional*) and, recently, WordPerfect Corp., are committed to producing *NewWave* versions of their products. Until the software collection grows, the *NewWave* desktop and Agent can be used to bridge DOS and *Windows* applications, but the process can be tedious and confusing. ■



The Agent is a high-level macro recorder. This Agent Task invokes the procedure for a square root operation.



HP NewWave Environment
Hewlett-Packard Co., Personal Software Division, 3410 Central Expwy., Santa Clara, CA 95051; (800) 752-0800. List Price: \$195.

Requires: Microsoft Windows 3.0, 10MB hard disk storage space.

In Short: A potentially powerful object-oriented extension of the Windows 3.0 environment, *NewWave* suffers from a lack of *NewWave*-specific software. A good (albeit somewhat confusing) bridge for DOS and *Windows* applications.

CIRCLE 440 ON READER SERVICE CARD

First Looks

\$49.99 Accounting Package Takes Care of Business

HANDS ON
by Raymond A. August

For the cost of a single business lunch, *Pacioli 2000* can run your whole business. It's a multiuser-capable, double-entry accounting system, complete with video training, manual, and free technical support—all for \$49.99.

Named for the Renaissance-born Fra Luca Pacioli, the "Father of Bookkeeping" who systematized double-entry accounting, the program has eight integrated modules: accounts receivable, accounts payable, general ledger, inventory control, billing, purchasing, budgeting, and auditing.

Pacioli was created by Jose M. Hurtado, who also developed *DACEasy*, a widely acclaimed low-cost accounting package. Interestingly, *Pacioli*'s user interface is very similar to that of *DACEasy*'s. Version 4.0 of *DACEasy* (see "Price Waterhouse Report: Economy Class Accounting PC Magazine, April 10, 1990) was the first PC accounting software to use File, Transaction, and Reports subsystems, rather than the functional G/L, A/R, and A/P type selections. *Pacioli* is

currently the second.

The user interface is simple and well designed—easy to navigate with or without a mouse. In addition to documenting the program, both the manual and video tape include tutorials in DOS and accounting, and also provide practical examples on how *Pacioli* can help you run your business.

Pacioli divides an account into nine levels of increasing detail. The most global level includes Assets, Liabilities, Capital, Revenues, and Expenses. Below that, each account falls into a class: Checking, Inventory, Receivable/Payable, or Normal. The number of accounts is limited only by your hard drive, and you can account for as many as 999 companies.

Data entry is smooth and efficient; all applicable data fields are supported by a Browse feature. If you don't know an account number, pressing F2 lets you browse the existing numbers. If the number doesn't exist, *Pacioli* lets you add it without leaving that screen.

Pacioli has redefined the concept of a General Ledger account number by adding both vendors and customers to it. Accounting software veterans may



FACT FILE

Pacioli 2000, Version 1.06
M-USA Business Systems Inc.,
18111 Preston Rd., #500,
Dallas, TX 75252; (800) 345-4243.

List Price: \$49.99.

Requires: 640K RAM, DOS 2.0 for single-user installation, DOS 3.1 or greater for multiuser installation.

In Short: For \$49.99, this accounting package, with eight integrated modules, gives you enough power to run a small-to-medium-sized business.

CIRCLE 555 ON READER SERVICE CARD

find this single master file structure confusing. The additions do little to enhance usability, but they vastly increase the number of records you must wade through while browsing.

Furthermore, vendor and customer entries have the same tight restrictions normally placed on General Ledger accounts. You cannot delete any vendor or customer that's had activity in the last 36 periods, forcing you to hold on to dead customers or vendors far too long.

Transactions are entered into one of three screens; Accounting, Purchases/Sales, and Checks. The Accounting screen handles seven different types of transactions including Journal Entries, A/R Payments Received, and A/P vouchers. Although this screen would please Fra Luca Pacioli, it could leave nonaccountants confused, because it requires that you enter both the Debit and Credit for each transaction.

The Check screen, where vouchers and purchase orders are turned into checks, must be completed manually before printing any checks. Be careful when paying creditors; *Pacioli* allows you to enter and pay the same invoice several times and will print the same check number as often as you like.

Accounts Receivable billing is comprehensive. Customer credit balances can be tracked, interest charged to late payers, and individual customers can be specified as open item or balance forward. Invoices can be printed on either service or

product forms and statements can be printed with customized messages based upon the number of days past due.

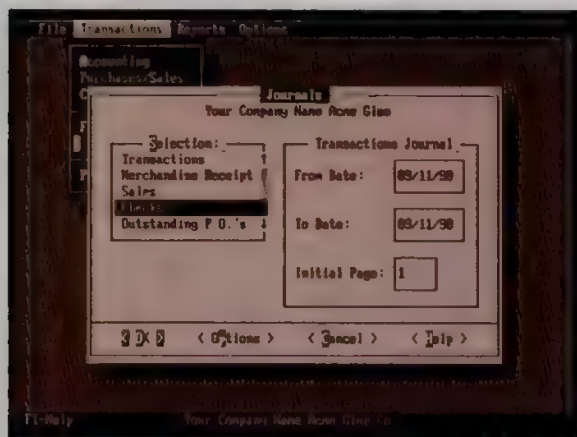
Inventory is one of *Pacioli*'s strong points. Five cost methods are supported. You can use different units of measure for purchase and sales, and convert purchase to sales quantities. So, if you purchase in cases and sell in six packs, that information will be converted automatically. Inventory prices can be automatically increased or decreased and customers can be charged based on one of three different price lists.

Pacioli's custom financial report writer comes with several predefined reports, and allows up to 14 definable columns for each report. You can also report on any of the 36 periods that *Pacioli* maintains simultaneously. With Inventory, Receivable, and Payable reports, you can sort, subtotal, and rank by many different variables. Unfortunately, an Aged Trail Balance is the only Receivable and Payable financial report available, and *Pacioli* will not produce check register, invoices printed, sales analysis, or cash received reports. Reports can be exported to database, spreadsheet, or word processing files.

The auditing feature assists in the reconciliation of any account balance. You can "check off" each transaction denoting that it has been reviewed. Integration between modules is excellent: you can go from a Purchase Order to a Merchandise Receipt to a Check, all without rekeying any data.

M-USA's *Pacioli* comes entirely ready to run on any Novell or NetBIOS-compatible network, utilizing both file and record locking. No site licenses or per-user fees are required. The nine-level password security protected system can accommodate 999 users; users can configure the appearance of their screens and attach the description to their user ID.

M-USA promises that a separate payroll package will be shipping in November and it also plans to release products for the retail and time and billing markets, and versions for the UNIX operating system. ■



Pacioli 2000 is an 8 module accounting package. M-USA augments the program by offering pre-printed forms.

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First Looks

GrandView 2.0: New TSR Mode Adds Dimension To Classic Outliner

HANDS ON
by Henry Farkas-Wells

Once a standalone outliner/organizer, Symantec's *GrandView* can now be run in memory-resident mode, allowing it to become the hub of daily computer activity. The \$295 Version 2.0 also adds a calendar view to the outliner, lets you build text charts for presentations using commands from either *Freelance Plus* or *Harvard Graphics* (see sidebar), and has improved screens and menus.

GrandView has always been one of the best outliners available, offering extensive control over outlines with the ability to hide or show levels and subtext. In TSR mode, you get all this power by hotkeying from within any application.

Thanks to memory-swapping, *GrandView* uses less than 20K of RAM memory as a TSR. The default swapping scheme uses EMS first, but this can be changed from the command line. A pop-up box that appears during a swap indicates the percentage swapped. The program also behaves well with other memory-resident programs loaded.

The original *GrandView* offered an outline, category, or document view—three different

perspectives for a single source of information. Now you can see information from a fourth vantage point—the calendar. Here, every item associated with today's date is automatically displayed in a large box under the date. On the left side of the screen is a month-at-a-glance calendar. By clicking on a date you automatically call up the activities for that date. Special commands let you quickly maneuver around the calendar.

Another feature lets you display up to three columns of categories in any view other than document view. This spreadsheet-like approach lets you see columns of category assignments. For example, you might have project tasks as outline items running down the left side of the screen followed by columns for the date, priority, and person responsible for the task. There can be 20 categories for every outline; the original *GrandView* let you see only one category of information at a time. Columnar layouts can be defined and saved for future use.

Word processing stylesheets are another new layout feature. Stylesheets have preselected fonts, print styles, labels, and so on. The stylesheet automatically converts an outline into a formatted, finished report. The program comes with almost 20 predefined templates, including a business plan, bulleted checklist, and a proposal. You can create as many as you like and save them in a library. A Print Preview command lets you see the effects of stylesheets before you print.

Finally, a host of other new features include: PostScript printer drivers and support for the latest laser printers; customizable speed keys for commands; over a dozen import/export formats, including *WordPerfect*, *Q&A Write*, *MaxThink*, and ASCII; and the



GrandView 2.0 offers a helpful calendar view of an outline. Shown here are the tasks for the current date—which are the outline headlines—with the responsible individuals listed alongside. The calendar on the left side of the screen highlights task deadlines.

ability to define your own screen colors. There is also a file-linking capability that lets you automatically call up another outline from the headline in the outline on your screen—a bonus for network users because it allows people to own portions of a master outline.

Symantec hasn't neglected

cosmetics either. *GrandView* 2.0 has a more appealing screen design that uses more colors and shadow boxes. The menus are much better organized—with some commands nested under others. Even the on-line help is better. In all, *GrandView* is an excellent product that is now better than ever. ■

PRESENTING WITH GRANDVIEW

Outlining is probably the fastest and most natural way to create a presentation. Now *GrandView* outlines can be directly converted to *Freelance Plus* or *Harvard Graphics* text charts.

Creating text charts using *GrandView* is simpler than using *Freelance Plus* or *Harvard Graphics*. The headlines in an outline become chart titles; subheads become bullet items. You get the benefit of *GrandView*'s outliner to build and organize a presentation that automatically becomes a series of single- or multiple-level bullet charts.

When using *GrandView* as a TSR, you're able to toggle back and forth from the graphics program to see how outline or format changes affect your charts. *GrandView*'s spell-checker can be used to make sure your copy is error-free.

Text charting options for each graphics package appear under *GrandView*'s File menu. You choose color, font, and letter size for titles and bullet items. These can be used to create templates that are stored in a library.

With *Freelance Plus*, *GrandView* provides refined control of text and margins. With *Harvard Graphics*, you can select the border, transition effects, slide orientation, and the duration of an image. The HG connection also lets you create an organization chart from an outline.

Some Windows-based presentation graphics packages promise to incorporate built-in outlining. In the meantime, using *GrandView* as a front end to *Freelance Plus* and *Harvard Graphics* is an ingenious way to produce text charts.—HFW

PC FACT FILE

GrandView 2.0

Symantec Corp., 10201 Torre Ave., Cupertino, CA 95014; (408) 253-9600.

List Price: \$295; upgrade, \$50.

Requires: 320K, hard disk recommended, DOS 2.0 or later.

In Short: A capable outliner that can now be run as a TSR. A calendar view has been added to the outline, category, and document views of information.

CIRCLE #84 ON READER SERVICE CARD

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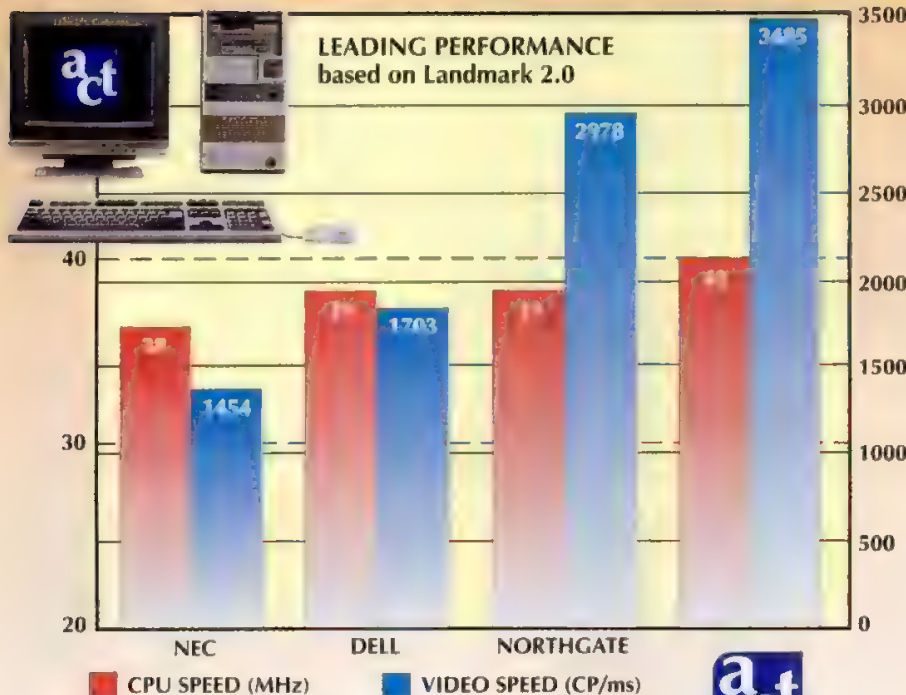
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First Looks

What-If Solver For 1-2-3

HANDS ON
by Craig Stinson

The ability to solve linear and nonlinear optimization problems is arguably the most compelling reason for users of DOS-based spreadsheet programs to move to OS/2 and Lotus 1-2-3/G (G). G's Solver utility (see "1-2-3/G: The Super Solver," August 1990) provides quick and accurate solutions to resource-allocation problems that, with conventional spreadsheet techniques, would require hours or days of guess work—if they could be solved at all.

Now a \$199.95 add-in product has trumped 1-2-3/G's strongest analytical drawing card, by providing optimization capabilities to users of Lotus's DOS-based spreadsheets. *What-If Solver* works on all versions of 1-2-3 (other than 1A and 1-2-3/G) as well as *Symphony*. With *What-If Solver*, as with 1-2-3/G, you can solve goal-seeking problems, multiple-variable goal-seeking problems, and linear and nonlinear optimization problems.

What-If Solver asks for three kinds of information: "what if" cells, constraint cells, and a single optimum cell. The "what if" cells are variables that can

be modified to produce the solution. For example, if you were going to determine what balance of items in your product line would produce the highest possible profit, the cells representing the quantity produced for each item would be your "what if" cells. The constraint cells would be those specifying real-world limitations that must be satisfied by *What-If Solver*'s solution. In this example, constraints might be imposed by the amounts of materials available. The optimum cell would represent the profit. Parameters can be specified by issuing menu commands and then either typing in values or pointing to worksheet ranges.

Unlike 1-2-3/G's Solver, *What-If Solver* doesn't estimate the percentage of the problem solved nor offer the convenience of background operation.

If a problem is unsolvable, *What-If Solver* provides diagnostic information. Otherwise, it displays its answer on the worksheet. At this point, you can press the Esc key to restore your original cell values or hit Return (or Enter) to accept the add-in's values.

The program will write all parameters and results out as a worksheet table. The table feature can save both the definition of a problem and the previous solution values. The table can also include shadow prices for constraints that proved binding and reduced gradients for non-basic variables.

Performance seems excellent. On my 16-MHz 386 system, the add-in took about 18 seconds to solve a linear "least costly shipping route" problem involving 15 "what if" cells and eight constraints. With a co-processor, the solution would arrive sooner. *What-If Solver* comes with eight sample appli-

cations and an eminently readable manual. ■

List Price: *What-If Solver*, \$199.95. **Requires:** Lotus 1-2-3 (2.x or later) and *Symphony* (1.1 or later), 100K of available memory. Frontline Systems, 140 University Ave., #100, Palo Alto, CA 94301; (415) 327-7297.

CIRCLE 436 ON READER SERVICE CARD

Financial Manager: Low-End Accounting + 1-2-3

HANDS ON
by Craig Stinson

Financial Manager combines a low-end accounting package, a popular spreadsheet program, and a bit of programming glue. The accounting package is Great American Software's *One-Write Plus* (Version 2.06), the spreadsheet is Lotus 1-2-3 (Release 2.2), and the glue is called *@Accounting*. Great American and Lotus jointly sell and support the \$795 package.

The idea is to provide analytical capabilities to managers of small businesses who have neither a spreadsheet program nor time to learn one. It's cheaper than hiring a consultant, and it looks to be every bit as good.

The *One-Write Plus* and Lotus 1-2-3 components of this package are standard-issue items. *@Accounting* is the link between them and for the benefit of those who happen to have both packages already, Great American also markets *@Accounting* separately, for \$99.

@Accounting is not a set of add-in Lotus functions. Rather, it's a data-transfer module written in Roundtrip, a fourth-generation programming language designed specifically for Lotus spreadsheets. (See the March 27, 1990, issue for a review of Roundtrip.)

@Accounting simply becomes another command on *One-Write Plus*'s main menu. Choose this command, and the system presents a menu of worksheets. Take your pick: select the portion of your accounting records you want to analyze, and you're transported into 1-2-3 with the appropriately formatted

accounting data in place.

The data transfer takes place in one direction only, so you can massage the numbers without damaging the underlying database. When you're ready, /Q takes you back to where you left off in *One-Write*. The package provides seven kinds of analysis worksheets: forecasts, trends and ratios, cash-flow analysis, SuperTrack analysis, trial balance, loan analysis, and graphs. The loan-analysis worksheet has nothing to do with your accounting data. It's just a handy amortization schedule that can be used for any kind of loan.

The *@Accounting* menu also includes a command that invokes 1-2-3, without accounting data or worksheet file. You can use this as a numeric scratch pad while you enter transactions into the accounting system.

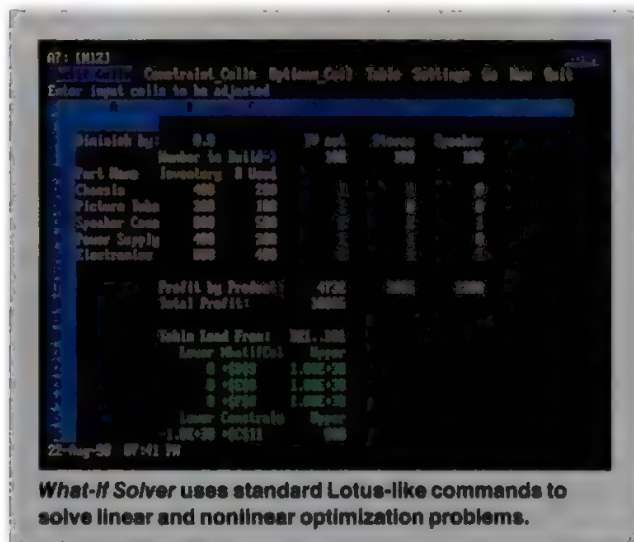
Each of the system's worksheets is annotated with simple English instructions which are written into the first few rows of the worksheet, so the user can always return to them by pressing the Home key.

One-Write Plus includes three modules: Master (general ledger, checks, and receipts), Accounts Receivable, and Accounts Payable. It can also monitor up to 99 companies.

For the person who's already juggling 14 balls and can't be bothered with learning slash commands and @ functions, *Financial Manager* is an excellent idea. ■

List Price: *Financial Manager*, \$795. **Requires:** 512K RAM, DOS 2.0 or later. Great American Software Inc., 615 Amherst St., Nashua, NH 03063; (603) 889-5400.

CIRCLE 436 ON READER SERVICE CARD



What-If Solver uses standard Lotus-like commands to solve linear and nonlinear optimization problems.

First Looks

Capture, Convert and Compress Windows Graphics with ImagePrep

HANDS ON
by Luisa Simone

Great news! You no longer have to shell out of *Windows* in order to access file-conversion utilities for bitmapped images. Computer Presentations' \$295 *ImagePrep* runs under *Windows* 3.0 and mimics the file translation and screen-capture functions of popular DOS-based programs like *The Graphics Link Plus*, and *Hijaak*.

ImagePrep's reliance on a graphical environment is not just window dressing. It takes advantage of *Win 3*'s memory management—a boon when working with files that surpass the megabyte mark. And in addition to .PCX, .GIF, TIFF (including color TIFF), .EPS and Targa files, *ImagePrep* includes access to what may become the raster equivalent of *Windows* Metafiles—Microsoft's .BMP format. If you still work with DOS-based programs you'll miss the standard formats it doesn't translate—*GEM*'s .IMG files, the *WordPerfect* (.WPG) files, and translation to faxable pictures.

ImagePrep's focus on *Windows* is further emphasized by its screen-capture functions. The normal features are here:

redefining the hotkey, choosing a file extension, and capturing a full screen. But *ImagePrep* is smart enough to capture only the active window, a defined area of the screen, or the active client window. *ImagePrep* doesn't allow you to interactively name the captured file or to capture DOS sessions. Nor does it allow you to specify the bit level of the captured image. The default 8-bit (256-color) format accounts for the extra step of converting captured images to 16- or 8-color .PCX files.

Though *ImagePrep*'s menus are simply arranged, things can get confusing because the terms used on the menus don't always refer explicitly to the processes they will invoke. It's easy to choose between color, gray scale, and monochrome palette options, but unless you peruse the manual you won't understand how Ordered versus Distributed dithering will affect your image. The first option employs the Bayer dither to reduce a full-color image to an 8-color file, while the second produces 256 colors with the Floyd/Steinberg algorithm.

The dither method, the assigned palette, and the target

file format all jointly determine how the image will be processed. You can even see specifications such as bit level, pixel count, and file size for the Source image, the Display image, and, heaven be praised, for the Processed image by clicking on various status buttons.

While *ImagePrep* displays on VGA and even EGA screens, the actual translation process is independent of the screen image—and for good reason. Unless your graphics adapter is extended VGA or better, the screen image is a mere shadow of the source image—and cannot be used to judge the quality of the picture file.

Though it addresses standard file formats, *ImagePrep* uses proprietary technology. The Optimized Palette Reduction (OPR) algorithm produces a unique colormap from the RGB values in a 24-bit file. And when a file sports *ImagePrep*'s proprietary .CPI extension, you can opt to compress it. I used a very conservative compression level of 4 (on a scale where 1 produces the highest image

quality and 20 produces the most compressed file) and found that a half-meg picture could be stored in a 50K file.

Some functions, such as sizing, and direct printer output, are notably missing from *ImagePrep*'s toolset. However, the translation routines that allowed me to reduce a full-color image to 256 grays, or to export an 8-bit picture as an .EPS file consistently produced high-quality results. The only problem I encountered during testing centered around *ImagePrep*'s inability to read a compressed Targa file. All other images loaded without a hitch. The program tackles the problems of processing full-color RGB images, and 256-color images within the limitations of *VGA Windows*—making it an important new graphics utility. ■

List Price: *ImagePrep* 3.0, \$295. **Requires:** IBM 286 or 386 compatible computer, 640K RAM, *Windows* 3.0. Computer Presentations Inc., 1117 Cypress St., Cincinnati, OH 45206 (513) 281-3222.

CIRCLE 433 ON READER SERVICE CARD

Phips: For Color Reduction

HANDS ON
by Larry Simon

Phips, short for Professional High-resolution Image Processing System, is a \$349 DOS-based color-reduction program from TerraVision, the makers of the highly respected bit-mapped file-conversion program *TGL+*. Through sophisticated algorithms, *Phips* does a fine job of taking full-color images from formats such as Targa (16-, 24- or 32-bit formats) and rendering the image with reduced color for desktop publishing or PC-based presentations.

Phips can reduce and then display Targa images on EGA and VGA screens and supports a resolution of up to 800 by 600 by 256 on a number of Super VGA cards. Or you can do the reverse and translate VGA images to .TGA format for further coloring. Reduction algorithms, for example, include "modified popularity" and "median-cut." The documen-

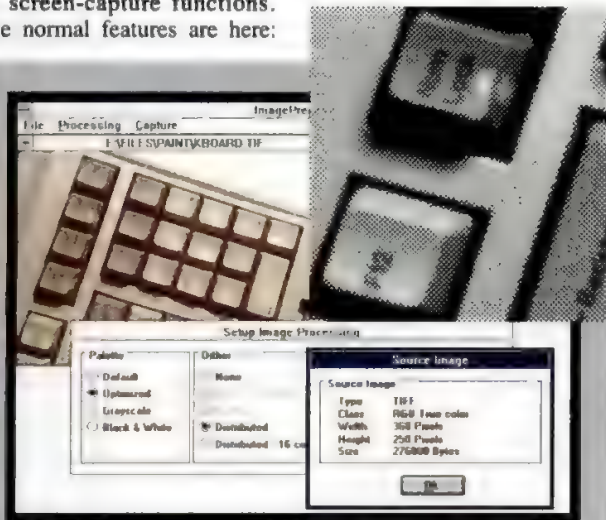
tation helps you select the best reduction process. In addition, there are various dithering, gray scale, and palette sorting, contrast and brightness options.

Phips reads directly only from Targa files, but external conversion utilities bundled in the package accept input from .PCX, .GIF, TIFF, Mouse Systems .PIC, and *ColorRIX* .VMG. It will save to most of these and .EPS files, as well. Targa files can be saved with compression.

Phips uses its own *Windows*-like graphical interface. *Phips*'s on-screen 256-color reductions are the best color images I've seen on my Video 7 VRAM, and I can't believe that the 256 gray-scale images I printed out were really made on my HP LaserJet III. ■

List Price: *Phips*, Version 1.4, \$349. **Requires:** 640K RAM. TerraVision, 2351 College Station Rd., #563, Athens, GA 39605; (404) 769-5641.

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Though VGA hardware limits *ImagePrep*'s display to 8 colors, the actual image processing is robust.

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First Looks

KnowledgePro Windows: Application Development Rooted in the Expert System Tradition

HANDS ON
by Richard Hale Snow

Application development tools for Windows 3.0 are appearing en masse. Some products, like Asymetrix *ToolBook* (First Looks, July 1990), offer a development environment for power users. Others, like Whitewater Group's *Actor* (First Looks, September 25, 1990), are designed for programmers. One that fulfills the needs of both groups is *KnowledgePro Windows*, a \$695 Windows application development system from The Knowledge Garden.

The backbone of *KnowledgePro* is the KnowledgePro language: an event-driven, message-based language with object-oriented features like multiple inheritance. You don't write programs in *KnowledgePro* but instead create a text file, called a knowledge base. Each knowledge base consists of one or more topics that contain commands, functions, and subtopics. These topics perform actions, prescribe a behavior, or service hypertext requests. Once you link a topic to a screen object—be it a window, a button, or a custom-designed bitmap—the object will act according to its defined behavior.

Topics specify what happens when the user clicks on or selects an object; they can also create hyperregions: rectangular areas that can extend over any graphic or text element. Once activated by the user, the hyper-region topics can open additional windows, display additional text, or pop-up dialog or message boxes.

KnowledgePro offers full topic subclassing with multiple inheritance, a feature that distinguishes it from *ToolBook* and pushes it closer to packages like

Actor and *Smalltalk/V*. This facility lets you create classes of topics, where one topic derives its attributes from more than one base topic, making it possible to easily create a hierarchy of highly usable, modifiable source code.

KnowledgePro's support for Windows objects is much richer than *ToolBook*'s. To begin with, you're not restricted to operating within a single window. You can also control a window's border style, maximize or minimize it, set its title bar, and designate its icons. *KnowledgePro* also provides some predefined user window styles, as well as several useful commands that are available to move, size, scroll, and display a window.

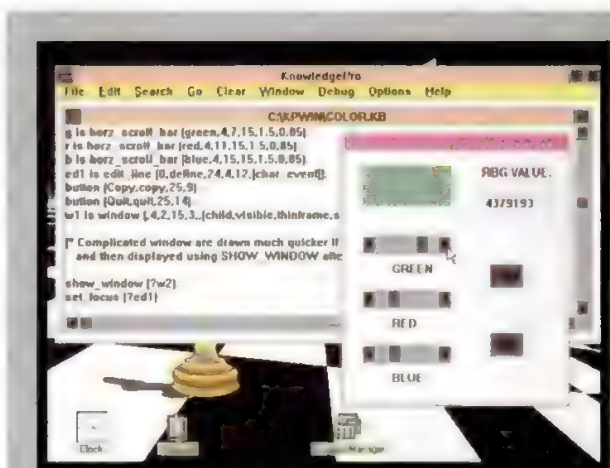
KnowledgePro also offers independent scroll bar objects. Commands like Ask display a message box and prompt the user with a list box of choices, and *KnowledgePro* lets you create your own Windows menus, as well as check and disable the menu items.

A WEALTH OF KNOWLEDGE

KnowledgePro's rich function set contains string and financial operations, as well as some unusual extras such as facilities for performing set operations against lists. There are also functions for loading and executing other Windows programs as well as support for Windows Dynamic Data Exchange (DDE).

Additionally, you can write your own C functions and call them from *KnowledgePro*, or access C functions in a Windows Dynamic Link Library (DLL).

The program offers some expert systems facilities, too. As a matter of fact, its predecessor, *KnowledgePro DOS*, is an expert system development tool,



KnowledgePro Windows comes with a number of knowledge bases that contain source code to complete applications. The source code is shown in the window.

with an inference engine and full forward- and backward-chaining. *KnowledgePro Windows* inherited some of these features—the use of a knowledge base and topics instead of source code files and functions. You don't have to, but you can add rule-based artificial intelligence to your Windows applications.

Despite the powerful language and functions, I found *KnowledgePro*'s application design tools lacking. The tools include a simple font generator and an interface design tool, both provided in source code. The interface designer lets you create, position, and resize Windows objects in a window, generate the *KnowledgePro* code to create and manipulate them, and copy the code, via the clipboard, to your application. The font generator lets you configure custom fonts from the available Windows fonts.

The tools are rather limited and operate in a nonstandard way. For instance, most GUI design tools let you use the mouse to put the object into position in the interface. With the *KnowledgePro*'s interface design tool, you click where you want the object to be, and the object jumps to where you clicked. Further, you have to use the keyboard to resize an object because the mouse doesn't support resizing. This lack of consistency and elegance prevails throughout the product. It

certainly won't keep you from being productive, but it does make the time you spend working less enjoyable.

On the other hand, *KnowledgePro* doesn't suffer from the speed or bitmap size problems that *ToolBook* does. And, while it can't produce a standalone .EXE, the runtime module is free. *KnowledgePro* is simpler than *Actor* and easier to understand, and though it lacks the elegance of *ToolBook*, it's more flexible and powerful. Despite an absence of polish, it's a powerful Windows development tool for both power users and developers. ■



FACT FILE

KnowledgePro Windows,

Version 1.0

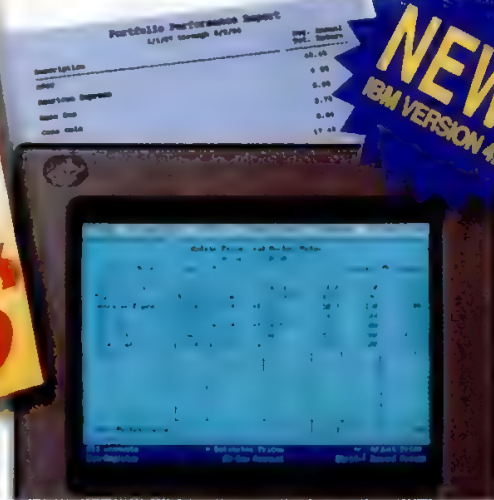
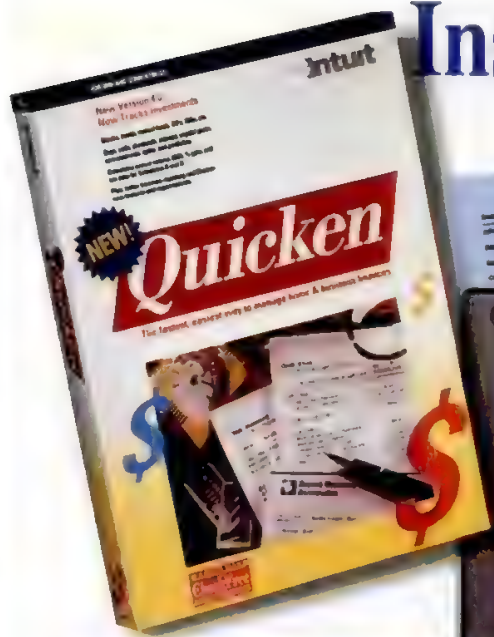
The Knowledge Garden, 473A Malden Bridge Rd., Nassau, NY 12123; (518) 766-3000, fax (518) 766-3003.

List Price: \$695.

Requires: Windows 3.0, 1MB of memory, EGA/VGA monitor. In Short: A powerful Windows application development system for both power users and developers. Features a strong programming language with facilities for manipulating a wide variety of Windows objects, the ability to access DLLs and implement DDE. Not as elegant or as polished as its competitors, but a good value nonetheless.

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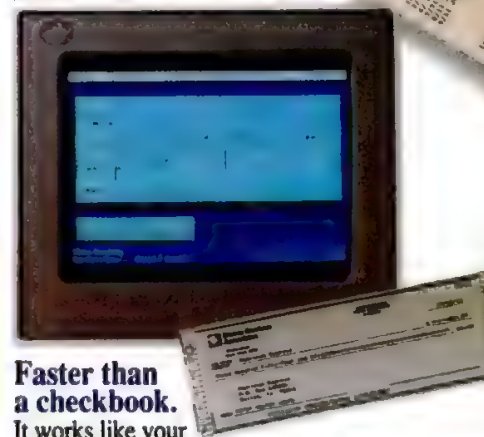
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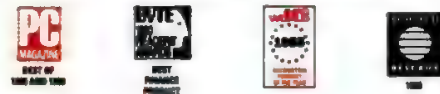
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First Looks

SLR's OPTLINK: A Fleeter Linker

HAND-ON
by Ray Duncan

For many years, assembly language software developers (including myself) were reconciled to coexisting with Microsoft MASM's (Macro Assembler) many quirks and leisurely processing. SLR Systems' OPT-ASM made life considerably richer—and paved the way for Borland's Turbo Assembler (TASM), and goaded Microsoft into making some long-overdue improvements in MASM itself.

Now SLR Systems is finally extending its line of programming tools with three upward-compatible replacements for the Microsoft linker: SLR's OPT-

LINK/Compress for DOS, OPTLINK/Windows for Microsoft Windows, and OPTLINK/2 for OS/2.

SLR's primary selling point for OPTLINK is the program's dramatically increased performance. SLR claims that its linkers are up to 11 times swifter than their Microsoft counterparts. In my own informal testing, I found OPTLINK/Compress to be consistently at least four times as fast as Microsoft LINK 5.10. On these grounds alone, the casual programmer would find it hard to justify the cost of OPTLINK. But for the serious software developer, this four-fold performance improvement can eliminate many hours of wasted time during the construction of complex systems.

The SLR linkers also offer a number of unique features. They support additional useful parameters and switches; they accept wildcards in object file-

names; they produce fewer spurious warning messages; they generate detailed symbol tables; they can use EMS or XMS memory for virtual storage (and disk files); the OS/2 version exploits multiple threads for increased throughput; and the DOS version can generate absolute images directly.

The most interesting capability of the SLR linker family is OPTLINK/Compress's ability to emit a compressed program file. When the file is later executed, a decompression routine that is automatically embedded in the program by the linker receives control first and expands the program into its original form "on the fly." The space savings can be quite significant; one of my own company's products, which resulted in a 41,128-byte .EXE file when I used the Microsoft linker, shrank down to 22,465 bytes when I switched to OPT-

LINK/Compress.

The weak point I found in the SLR OPTLINK products was the documentation. Much of the manual is "generic" to all three versions, so you must ferret out the information about features, configuration options, and error messages specific to your linker. This is a minor drawback, though, for most programmers will use OPTLINK as a direct replacement for the Microsoft linker and will find the on-line help to be sufficient explanation of any differences.

List Price:

OPTLINK/Compress, OPTLINK/Windows, and OPTLINK/2, \$250 each.

Requires: 256K RAM, DOS 2.0 or later, Windows 2.03 or later, or OS/2 1.1 or later. SLR Systems Inc., 1622 N. Main St., Butler, PA 16001; (412) 282-0864, fax (412) 282-7965.

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MicroPhone II for Sophisticated Communications

HAND-ON
by M. David Stone

Microsoft's inclusion of Terminal as a Windows utility raises the question, "Is there any point in buying a communications package?" MicroPhone II from Software Ventures Corp. is a \$295 answer that rates as a slightly qualified yes.

Terminal in Windows 3.0 is basically a full-function program. Among its features are auto-dial, DEC VT-52 and VT-100 emulation, storage of as many phone numbers and communications settings as will fit on disk, the ability to define up to 32 macros for each phone number, and the ability to send or receive ASCII text with Xmodem or Kermit protocols. What's missing is a script language, but you can do a lot with the macros.

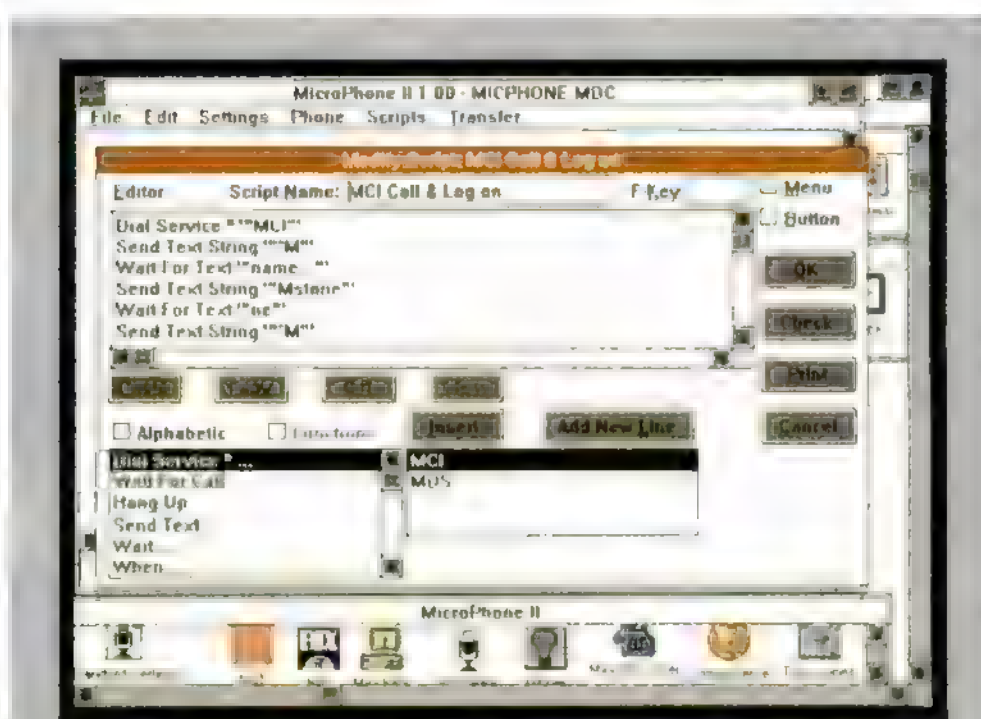
To be taken seriously, MicroPhone II needed to outdo Terminal. It does. It has everything Terminal has, except Kermit protocol and a macro feature. However, it adds Xmodem 1K (often called Ymodem),

Ymodem batch (also often called Ymodem), and Ymodem G (for modems with their own error-correcting protocol).

More than making up for the lack of macros is one of the most sophisticated, easy-to-use script languages of any communications program. The language has 50 key commands, most of which offer several variations. The Wait command, for example, includes the options wait for text, wait for line containing . . . , and five others.

It also offers flow control (if, else, when, while), variables, and the ability to analyze text strings. Other commands are communications specific (send line, set comm param) or Windows-specific (message box, install button). You can even call on another script to create scripts as subroutines.

MicroPhone II includes a learn mode to record a log-on or other procedure. And as with the best of those programs, MicroPhone produces a script with both sides of the conversation. This ensures that when you play back the script, MicroPhone



Microphone II's script feature lets you choose commands from a list, then prompts you for the syntax.

will, for example, wait for the appropriate prompt before giving a password.

Where MicroPhone departs from other programs is the ease with which you can assign the scripts to function keys, pull-down menus, or radio buttons. When you are writing or editing a script in the script editor, the program lets you pick script commands from a list, then guides you through the proper syntax for the command.

MicroPhone makes automating communications easy,

and creating templates almost as easy. If you need short, interactive sessions on-line, Terminal will probably serve. But if you need to automate complex tasks, MicroPhone II can optimize your efforts.

List Price: MicroPhone II, Version 1.0, \$295. **Requires:** hard disk, 256K RAM, Microsoft Windows 2.0 or later, DOS 3.0 or later. Software Ventures Corp., 2907 Claremont Ave. #220, Berkeley, CA 94705; (415) 644-3232.

CIRCLE 430 ON READER SERVICE CARD



In Redondo Beach, California . . .

You'll find breathtaking ocean views, sensational surfers and Gateway 2000 computers.

Dive 'N Surf, famous for Body Glove® fashions and watersports equipment, is a



Graham Pask, Computer Systems Manager for Dive 'N Surf, and his Gateway 2000 25 MHZ 386 network server.

member of the growing family of Gateway 2000 customers in California. Dive 'N Surf Computer Systems Manager Graham Pask chose a Gateway 25 MHZ 386 machine for his network server. The system runs point-of-sale, inventory control, word processing and desktop publishing software.

"I decided to buy a Gateway 2000 system because they had everything I wanted for a good price," said Graham. "But what really impressed me was the service. I had a problem with my 3 1/2 inch drive so they sent me a new drive the very next day."

Graham said he was so happy with his Gateway system at work that he bought a Gateway 2000 25 MHZ 386 Cache machine for his home.

Until well after sunset, surfers ride the big waves on the Pacific Ocean near Redondo Beach, California.



And In Barrow, Alaska . . .

Over 300 miles north of the Arctic Circle, you'll find polar bears, seals, whales, walrus, lemmings, snowy owls and what appear to be the largest mosquitoes in existence. On a summer afternoon you'll also see parka-clad tourists

walking among local residents in shorts. And of course you'll find a good Mexican restaurant and Gateway 2000 computers.

Cape Smythe Air Service, a regional commuter airline serving Barrow, Kotzebue, Nome and remote villages in Alaska, has one of several Gateway 2000 computers operating in Barrow. Jeff Frier, Cape Smythe's accountant, chose a Gateway 2000 386SX to

run spreadsheet, data base and accounting applications.

"I was trying to decide between Gateway 2000 and a competitor," Jeff commented, "so I talked to a person who owns the competitor's system. He was disgruntled about the service he received from them. Then I talked to another person in Barrow who has a Gateway and she was happy with the product and service. The choice was pretty obvious -- when you're doing business in a remote area, the most important things a vendor can offer are reliability and good service."

Jeff said he also appreciated Gateway's features and price. "When you have to pay \$6 a gallon for milk, it's nice to find a bargain somewhere." Jeff plans to buy another Gateway 2000 computer in a few months.



Jeff Frier, Cape Smythe Air Service, with his Gateway 2000 386SX.

On a mid-July day in Barrow, Alaska, fishing boats weave in and out of icebergs on the Chukchi Sea.



Near Camp Verde, Texas . . .

You'll find the magnificent Hill Country of Texas with rattlesnakes, prickly pear cactus and huge cattle ranches. You'll also find Larry Mahan and his Gateway 2000 computer.

Larry Mahan is to rodeo what Jack Nicklaus

is to golf. He is Six Times World Champion All-Around Cowboy and is a member of the Cowboy Hall of Fame. But Larry also runs a cattle and horse ranch and is involved in a western apparel manufacturing company and a new Southwestern foods company. His Gateway 2000 20 MHZ 386 system is an integral part of his business operations. "We run cow and calf software for



*Larry Mahan, rodeo star, and his
Gateway 2000 20 MHZ 386 system.*

our Longhorn cattle herd," Larry said. "You can't really manage a livestock business efficiently without it. Plus we do accounting, spreadsheets and word processing on our Gateway 2000 computer."

Asked why he chose Gateway 2000, Larry said, "They had the best features and price – and I thought a computer company that puts pictures of cattle in their ads had to be my kind of people. And I was right. The people I've talked with at Gateway 2000 are honest-to-goodness nice folks. It's a pleasure doing business with them."

Larry Mahan raises registered Texas Longhorn cattle.





In Bradford, Pennsylvania . . .

You'll find a charming small city nestled in the Allegheny National Forest. The city's most prominent local business is the Zippo Manufacturing Company, where you'll find 18 Gateway 2000 computers in use.



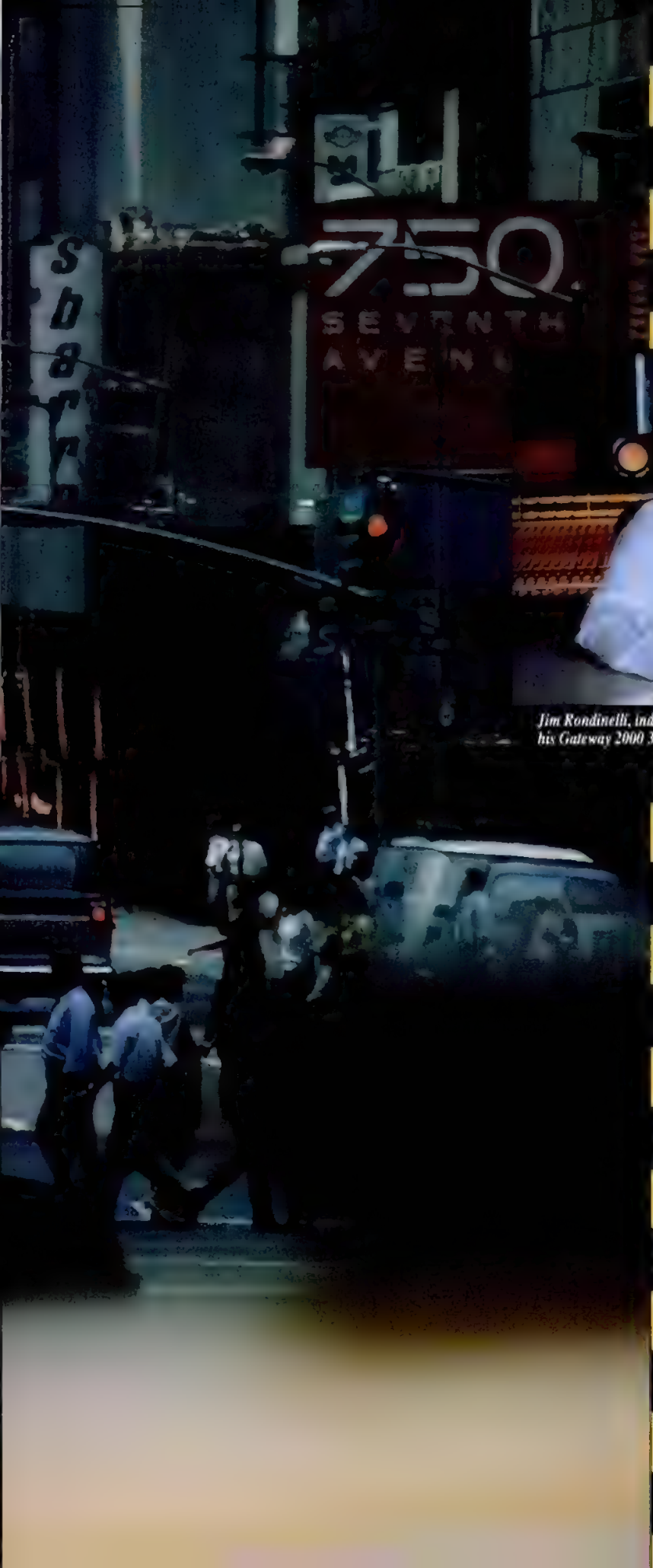
Fred Gronemeyer, Zippo Manufacturing Company, and his Gateway 2000 20 MHz 386 system.

Zippo is known around the world for its windproof lighter made famous during the second World War, although today the company's product line includes many other specialty advertising items. Fred Gronemeyer, Systems Analyst for Zippo, chose Gateway 2000 as the company's standard PC.

"We needed to set standards for PC's and software to make the most efficient use of these tools," Fred remarked. "We started out with PC's from different manufacturers, but once I tried Gateway I was convinced we could get the highest quality, most reliable machines at the best price from Gateway 2000. I was also impressed by my salesman and the tech support people I've dealt with at Gateway."

Fred said by the end of the year Zippo will be running every system Gateway 2000 makes, from 286's up to a 486 and everything in between.





And In New York City . . .

You'll find your senses overwhelmed by the countless sights and sounds of this one-of-a-kind city. And of course you'll find thousands of Gateway 2000 computers here.

One New York City Gateway 2000 owner is



Jim Rondinelli, independent record producer and engineer, with his Gateway 2000 386SX.

independent record producer and engineer Jim Rondinelli. Jim uses his Gateway 2000 386SX with a sophisticated player piano sequencer to compose music.

"The software I use is written for the Mac and for IBM compatibles," Jim said, "but it runs much better on IBM compatibles. And it runs best of all on my Gateway. I travel often and I've used my software on a lot of other machines. They don't even compare with my Gateway 2000."

Jim said he bought his Gateway 2000 because it was equipped for the real world with ample hard drive capacity and RAM, both sizes of disk drives and color VGA graphics.

"It's the fastest file transfer computer I've ever used," continued Jim, "plus it ran right out of the box. One afternoon and I was fully functional on a brand new system."

The streets of Manhattan are a constant blur of activity.

ACROSS THE COUNTRY YOU'LL FIND

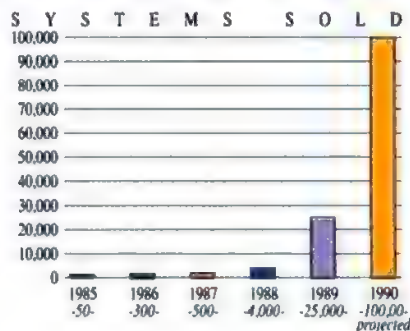


You'll find so many Gateway 2000 computers in so many places today because people everywhere know a good value when they see one. In all 50 states and in over 70 foreign countries, thousands of people are comparing prices, quality and service – and choosing Gateway 2000.

But value alone doesn't explain how a little company in the Midwest, started just five years ago, managed to outdistance hundreds of other companies, selling more systems through the direct market channel today than any other PC manufacturer in the country.

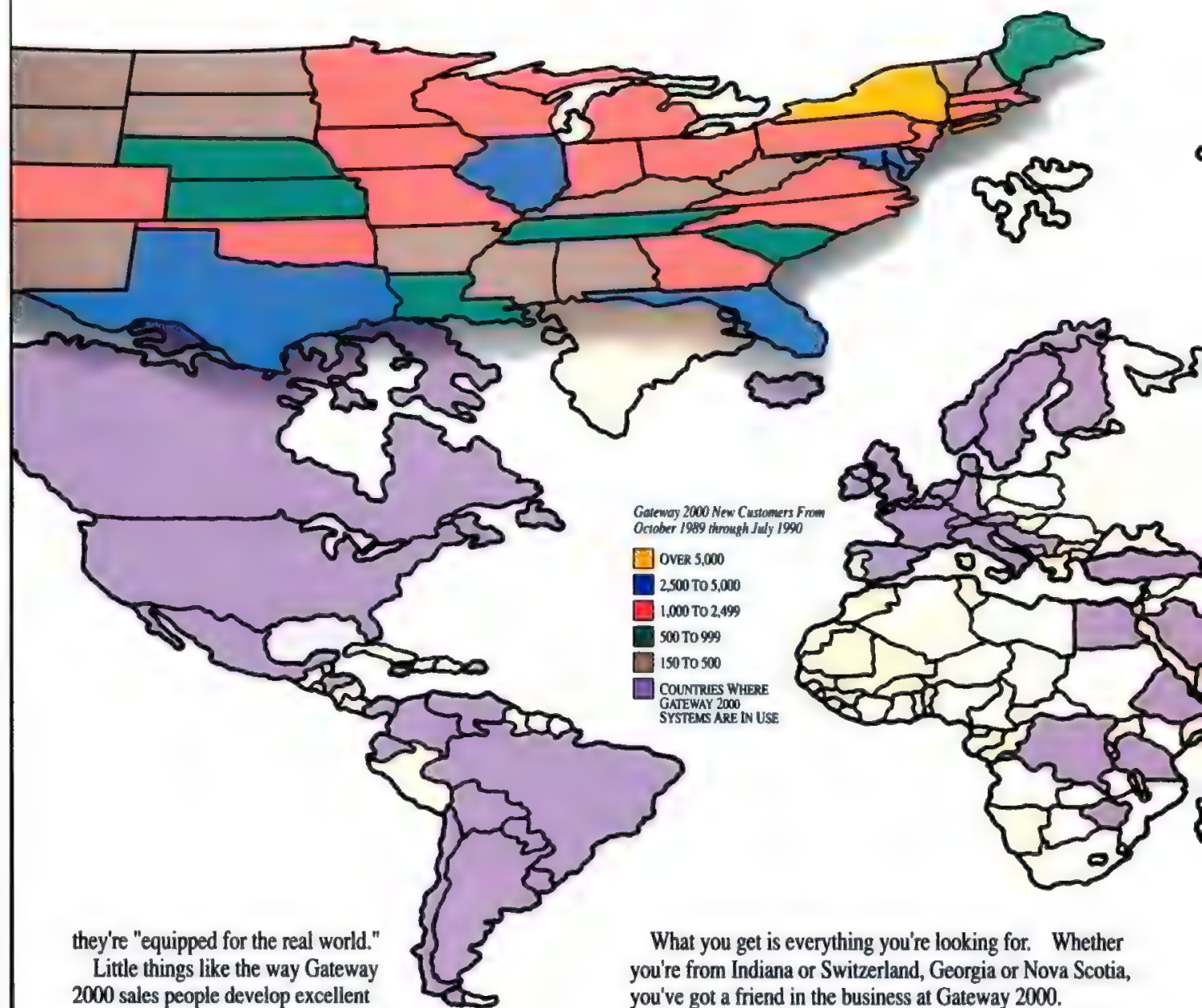
The explanation is that the company has always maintained a small company attitude. With Gateway 2000, you still get the little things you'd expect only from a small firm.

Little things like a positive technical support department. When Graham Pask told his Gateway 2000 tech rep that his 3 1/2" drive didn't work, he received a new drive the very next day.



Little things like the way Gateway 2000 systems are fully loaded with all the features you want. Jim Rondinelli bought a Gateway 2000 computer because

AND AROUND THE WORLD, GATEWAY 2000!



they're "equipped for the real world."

Little things like the way Gateway 2000 sales people develop excellent business relationships with their customers.

Fred Gronemeyer tried his first Gateway because he was impressed by his sales person. Eighteen systems later, Fred is still impressed by his sales person.

And the biggest little thing of all is the feeling you get when you deal with the people at Gateway 2000. As Larry Mahan said, "they're honest-to-goodness nice folks."

Compare prices, quality and service. Then add up the little things you get from small town people running an old-fashioned, high-tech business.

What you get is everything you're looking for. Whether you're from Indiana or Switzerland, Georgia or Nova Scotia, you've got a friend in the business at Gateway 2000.



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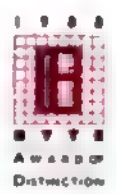
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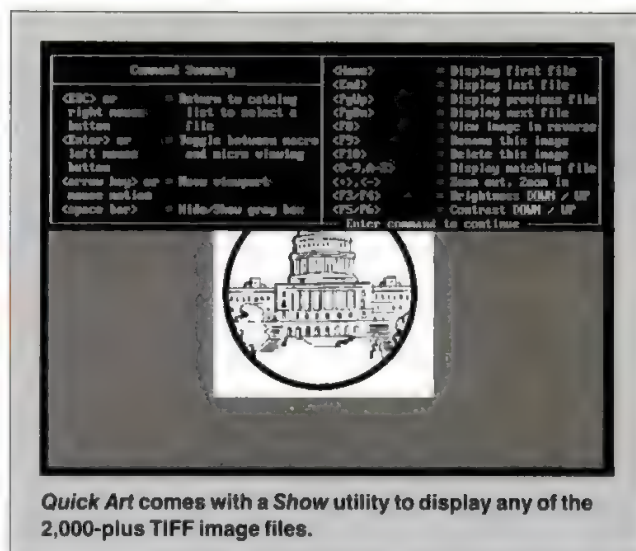
First Looks

Single CD-ROM Holds 2,000 Clip-Art Images

HANDS ON
by Don Trivet

Most PC clip-art libraries are limited to several hundred drawings, because graphic images take up so much disk space. Wheeler Arts has solved the space crunch by releasing part of its art collection on CD-ROM—a medium with a capacity of a half a billion bytes per disk.

Titled *Quick Art* and published by Quanta Press, the Wheeler disk has more than 2,200 images in 300-dot-per-inch resolution. The 23 categories include animals, books, maps, food, sports, and travel. Some years ago Wheeler found a market for paper clip art in extension offices, farm bureaus, and related agricultural services, and that collection forms the core of the *Quick Art* CD-ROM. In the food group, there are more than 350 images ranging from apples to hazelnuts.



Quick Art comes with a Show utility to display any of the 2,000-plus TIFF image files.

Hundreds of related images can be found in the farm, plant, spice, and tree groups.

The *Quick Art* CD-ROM is divided into 17 subdirectories, with some subdirectories containing as many as 200 image files. Neither the subdirectories nor the files are descriptively named, so finding the right image can pose a real problem. Quanta Press provides both a search program and a printed catalog for quick reference.

In the search program, enter the word "money," and you'll

get a screen full of possibilities, but no help previewing the actual images. Recognizing this shortcoming, Quanta distributes a utility disk that lets you view each picture (in future versions this program will be on the CD-ROM).

Show is actually a crippled version of the popular *Collage Plus* software, and although it automatically sizes images for preview, it has no options for printing or copying the image files to another directory. A desktop publisher like Aldus

PageMaker or a top utility like *Graphics Link Plus* is needed to display, scale, edit, and print the *Quick Art* images.

Since they were scanned directly into level 5 TIFF files from various sizes, the images vary considerably in size and detail. *Show* compensates for this, but with other software, like *Graphics Link Plus*, you will have to shrink some images by up to 80 percent to get them on the screen. Most images are simple line drawings, with perhaps five percent of the collection made up of gray-scale images. There are no color images, but many of the line drawings are quite bold.

Quick Art's value is in its number and variety of images. With the printed catalog as a reference, *Quick Art* becomes a genuine dollar-per-image bargain. Quanta Press, a leader in inexpensive CD-ROM publishing, is so sure you'll agree that it offers a full, unconditional refund if you're not satisfied. ■

List Price: *Quick Art*, \$299.

Requires: CD-ROM drive, Microsoft Extensions 2.0, graphics adapter, 640K, DOS 2.0 or later. Quanta Press, P.O. Box 8044, St. Paul, MN 55108; (612) 641-0714.

CIRCLE 436 ON READER SERVICE CARD

Adobe's PostScript Cartridge for LaserJet II: High-Speed Output, Top-Notch Software

HANDS ON
by Edward Mendelson

If you're thinking of upgrading your LaserJet Series II, Adobe's \$495 PostScript cartridge may make you think again. When you plug Adobe's cartridge into the cartridge slot on your LaserJet II, you get some of the fastest and highest quality PostScript printing available on a desktop. You also get software that improves your flexibility when you use the printer in its native LaserJet mode.

Like Hewlett-Packard's Adobe-licensed PostScript cartridge for the LaserJet IIP, IID, and III, the Adobe cartridge includes Adobe Type Manager (ATM) technology for the fast-

est available text printing and the sharpest available font-rendering at 300 dots per inch. In PC Labs' tests, the cartridge printed text at 7 pages per minute and graphics at 0.38 ppm—only a shade slower than the HP cartridge in the LaserJet III with that printer's faster controller. Like most other cartridges for the Series II, Adobe's needs a total of 1.5MB of RAM in the printer. Don't even think of plugging it into later LaserJet models or LaserJet-compatible printers from other manufacturers—the cartridge works only with the Hewlett-Packard LaserJet II.

Adobe's cartridge includes 35 PostScript fonts and works with Type 1 soft fonts. It also

lets you increase your font options with the \$395 Adobe Type cartridges. Plug one of these cartridges into the LaserJet's second available slot to access a dozen or more additional fonts without downloading. Two Type cartridges are available now; more may arrive later.

The software comes in three parts. First is a Printer Control Panel, a 6K TSR program from LaserTools Corp. that switches your printer from PCL to PostScript mode and back depending on the kind of print job you send it. It can also be set to print spreadsheets sideways or almost any other custom print setting you need.

Second is a set of soft font equivalents of the 35 fonts included in the cartridge. You won't need these for printing, but you will need them for the third part of the software, Adobe's new Font Foundry pro-

gram. This generates screen fonts for *Windows* and *Ventura* in any size you choose and generates bitmap printer fonts for use in the LaserJet II's native PCL mode. If you want the speed of LaserJet printing with *Avant Garde*, *Palatino*, or any other of the PostScript 35 or any other Type 1 font, Font Foundry makes it possible.

Adobe's cartridge can't give a LaserJet II the resolution enhancement of the LaserJet III, but it gives you the best PostScript printing possible with the classic Series II—and software that makes the job effortless. ■

List Price: PostScript cartridge, \$495, Adobe Type cartridge 1 and 2, \$395 each. **Requires:** LaserJet Series II with 1.5MB RAM. Adobe Systems Inc., 1585 Charleston Rd., P.O. Box 7900, Mountain View, CA 94039-7900; (415) 961-4400.

CIRCLE 438 ON READER SERVICE CARD

First Looks

Monarch Analyzes, Extracts, and Converts Mainframe ASCII Data Files



Today's managers tend to work with information from many different sources. Reports downloaded from mainframe or minicomputer applications and stored in ASCII files are common, as are reports generated across LANs, or output from PC accounting applications. Personics's *Monarch* lets you take this data to view it on-screen, manipulate it, summarize it, filter it, and extract some or all of the data to several supported formats, including *dBASE* and Lotus file formats.

The difference between *Monarch* and other "data translator" products is that *Monarch* is not just a data translator; it combines its extraction and translation savvy with a query and analysis system. *Monarch* can also handle multilevel reports with headers, footers, and multiple sort levels.

To use *Monarch*, you overlay an extraction template on top of your ASCII report file. First you tell it how to identify the detail lines. Then you define fields by pointing and painting over a detail line, followed by defining additional append fields for multilevel reports and header and footer information. You then add optional field formats and selection criteria, save everything to a model file for reuse, and output the resulting records to the printer or data format of your choice.

Once you've defined your extraction template, you can switch to table view to analyze the data. Here, the extracted data is presented in spreadsheet-like row-and-column format. You can select fields to exclude from output files and change the default field formats. *Monarch* automatically recognizes character, numeric, and data fields, and it supports several useful custom formats. For example, *Monarch* can intelligently parse

a name field into prefix, first, middle, last, and suffix fields by using the "full name" format, so "Mr. Robert K. Clancy III M.D." would be broken into separate fields containing "Mr.", "Robert", "K.", "Clancy", and "III M.D."

The same kind of parsing technology accepts multiline address fields, where some addresses are three lines, others four or more. *Monarch* also parses the last line into separate city, state, and zip fields. You can use the left and right split formats to break a field into subfields based on a separator character. You have to tell *Monarch* how many parts there are and what character separates them. For example, a record like "Brahms, Symphony No. 1" can be broken into composer and symphony fields by using a left-split format, specifying the number of fields as 2 and the separator as a comma. This can be handy for accessing fields that aren't split on fixed boundaries.

A mixed format allows for both character and numeric data in the same column, which can be useful if you want to output data to a spreadsheet and retain the column headings.

Monarch lets you define criteria for record selection—filtering only those records that meet the criteria—through its menu-driven prompted mode or directly, using a *dBASE*-like syntax. Compound criteria expressions are supported by linking expressions with AND and OR. Criteria functions can also be used to define data. For example, if your data includes a payment due date, the expression "(TODAY()-DUE_DATE) > 30" will match invoices more than 30 days past due. There are 14 functions available.

You can also have *Monarch* summarize the data in several different ways. You can summarize Sales by Region and show one record per region. And you can produce crosstab summaries that show field totals and record counts.

All of the template information, selection criteria, field formats, and other information can be saved to a model file for later use. Once a model file is defined, you can automate a *Monarch* session simply by passing the name of the desired model file on the command line as well as the name of the input file, output destination, and option



FACT FILE

Monarch 1.0

Personics Corp., 83 Great Rd.,
Maynard, MA 01754; (800)
445-3311, (508) 897-1575.

List Price: \$495.

Requires: 512K RAM, DOS
2.0 or later.

In Short: An excellent product
for analyzing and extracting
data stored in ASCII report
files.

CIRCLE 437 ON READER SERVICE CARD

information.

Monarch can work with any ASCII file, and if your application doesn't output to disk, a supplied utility can capture output intended for the printer and store it in an ASCII file. Another utility converts comma-delimited or .DBF files into fixed-length ASCII, or breaks long records into shorter ones for input to *Monarch*.

Monarch is missing a one-screen status display that shows what has been defined in the current model. And *Monarch*'s trap technology could be improved by allowing for multiple traps including an "exclude" command, since sometimes it's easier to define what shouldn't be included than it is to define what should be. It's possible, though unlikely, that you may have that one-in-a-hundred report whose detail records can't be suitably trapped using *Monarch*'s current techniques.

The documentation and tutorial examples are excellent—a big plus, as you may find some of *Monarch*'s terminology unfamiliar. But if *Monarch*'s terms seem slippery to grasp, the usefulness of this product isn't. If you have data stored in ASCII files that you wish you could manipulate, definitely consider *Monarch*.

Monarch can take data from other applications and generate multilevel reports with page headers, footers, and multiple sort levels.

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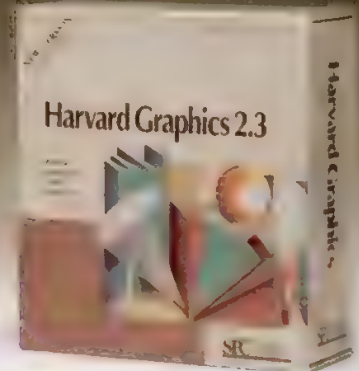
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		HCC Windows Express 3.0	52.00
		IBM Current	229.00
		Micrografx Designer 3.01	499.00
		Micrografx Chartman	359.00
		Microsoft Project for Windows	499.00
		OmniPage 386 2.1	599.00
		Pagemaker 3.01	499.00
		PC Paintbrush Plus for Windows	99.00
		Powerpoint	329.00
		Prompt 1.0	79.00
		Soft Type (2 Soft)	119.00
		Superbase 4 for Windows	429.00
		Tempo	75.00
		Toolbook by Asymetrix	305.00
		Wingz	105.00
		Word for Windows	329.00
		Xerox Formbase	325.00
		WORD PROCESSING	
		Displaywrite V	255.00
		Grammatik IV	52.00
		Nota Bene	335.00
		Rightwriter	55.00
		Word 5.0	209.00
		Word Perfect 5.1	249.00
		Word Perfect Net Add-On 5.1	189.00
		Wordstar 5.0	279.00
		XENIX/UNIX	
		SCO Foxbase + 386	655.00
		SCO Unix Dev. System 386	655.00
		SCO Unix Operating System 386	809.00
		SCO Unix Operating System 386	479.00
		Wordperfect for SCO Xenix 386 5 User	519.00



HARVARD GRAPHICS is the market-leading business graphic software for business profession. It's intuitive interface and superior ease of use allows instant productivity for all users. Full-featured drawing capabilities allow images to be easily customized. Practically limitless charting options allow a full range of capabilities with output capabilities for printing, color slides, overhead transparencies or free running computer ScreenShows. Add-on products for maps, business and military symbols enhance its large range of features. \$319.

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Showroom: 7959 Deering Ave., Canoga Park, California 91304.

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by
Rink Murray

New & Improved

News of Announced Products and Upgrades

Sanyo and Tandy Introduce Notebooks

NEW



MBC-17NB

Sanyo brings the MBC-17NB, its seven-pound 12.5-MHz 286 notebook, to market. The MBC-17NB features 1MB RAM expandable to 5MB, a 23-millisecond 20MB hard drive, backlit LCD with VGA graphics, a 3.5-inch high-density floppy drive, and a two-hour nickel cadmium battery. Expansion includes one slot for a modem, and two proprietary memory expansion slots.

List Price: MBC-17NB with 1MB RAM, 20MB hard disk, DOS 4.01, \$2,999. Sanyo Business Systems Corp., 51 Joseph St., Moonachie, NJ 07074; (800) 524-0047, (201) 440-9300.

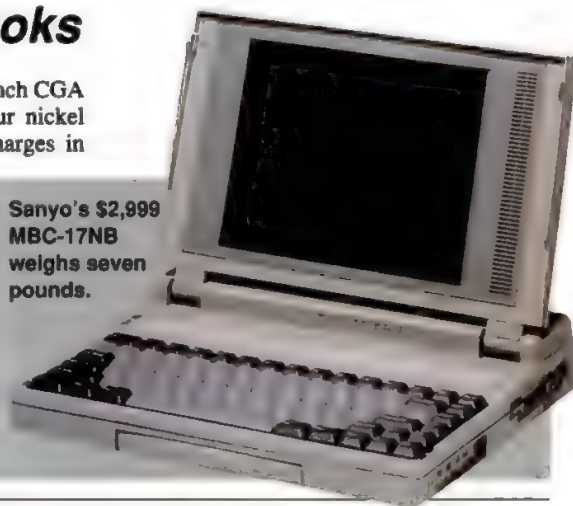
CIRCLE 443 ON READER SERVICE CARD

cess time, backlit LCD 7.5-by-4.8-inch CGA screen, and a rechargeable 3.5-hour nickel cadmium battery. The battery recharges in four hours with the unit off, eight with the unit on. Other features include an internal modem slot and *DeskMate* software.

List Price: 1500 HD with 640K RAM, 20MB hard disk, DOS 3.3, \$1,999. Tandy Corp., 1800 One Tandy Center, Fort Worth, TX 76102; (817) 390-3011.

CIRCLE 444 ON READER SERVICE CARD

Sanyo's \$2,999
MBC-17NB
weighs seven
pounds.



1500 HD

Tandy Corp. has begun shipping the 1500 HD, a 10-MHz V-20 notebook that weighs less than six pounds. The 1500 HD features 640K RAM expandable to 1.64MB, 3.5-inch high-density floppy disk drive, 20MB hard drive with a 23-ms ac-

Portable Presentations

NEW

Visualon's PC 9800 Memory LCD Panel allows users to give presentations without a computer. Weighing seven pounds, the PC 9800 features a two-inch disk drive that lets users store their images directly in the panel. The panel also includes software that lets

users arrange the images in any sequence. The user controls the presentation from the infrared remote control. The panel supports 28 shades of gray.

List Price: PC 9800 Memory LCD Panel, \$3,995. Visualon Inc., 3044 Payne Ave., Cleveland, OH 44114; (216) 566-0506.

CIRCLE 445 ON READER SERVICE CARD

Netroom Provides Headroom on LANs

NEW

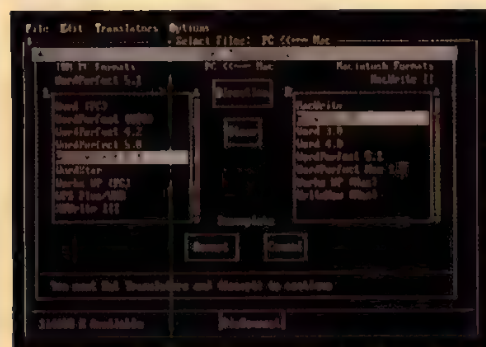
To relieve LAN RAM cram on the PC, *Netroom* from Helix Software Co. promises to free all the RAM occupied by networks. *Netroom* loads directly onto each PC, then locates memory not in use by your PC applications and uses it to support your LAN. *Netroom* can even swap LAN modules in and out of expanded memory, allowing that area to be shared with applications.

Netroom can allocate High DOS, expanded and extended memory to load LAN modules, TSRs, and device drivers. Helix claims that *Netroom* will save you anywhere from 64K to 500K RAM depending on your PC configuration. Networks supported by *Netroom* include Novell *NetWare*, IBM *PC LAN*, and Banyan *VINES*.

List Price: *Netroom*, \$149 for four users; 10 users \$249; 100 users \$595. **Requires:** 14K RAM, DOS 3.0 or later. Helix Software Co. Inc., 83-65 Daniels St., Briarwood, NY 11435; (800) 451-0551 or (718) 262-8787.

CIRCLE 446 ON READER SERVICE CARD

HOT PROSPECT



The user picks the format and *MacLinkPlus/PC* displays all the possible conversions.

FILE-CONVERT UTILITY CREATES MAC-IN-DOS?

DataViz Inc., a company specializing in Macintosh file conversion, announces *MacLinkPlus/PC* for transferring and translating files between Macintosh and any DOS, NeXT, or Sun system. The program's Mac software and PC software allow users to connect the Mac to a PC via either the serial port or modem. *MacLinkPlus/PC* can then access any disk or directory. With just a few clicks of the mouse, a file or group of files can be transferred and translated. *MacLinkPlus/PC* translates all formatting codes, including em-

bedded graphics, and notifies the user if the destination does not support a particular feature (such as italics or superscripts). *MacLinkPlus/PC* works with more than 100 programs including: *MacWrite*, *Microsoft Word*, *WordPerfect*, *PC Paintbrush*, *dBASE*, *AutoCAD*, *Harvard Graphics*, and Lotus *.WK1* and *.PIC* files.

List Price: *MacLinkPlus/PC*, \$199. **Requires:** 256K RAM, DOS 2.1 or later. DataViz Inc., 35 Corporate Dr., Trumbull, CT 06611; (203) 268-0030.

CIRCLE 442 ON READER SERVICE CARD

New&Improved

New Outbreak of Virus Protection Software

NEW



PC-cillin

Trend Micro Devices' *PC-cillin* is a hardware/software package designed to catch all known and unknown viruses. *PC-cillin* works in the background analyzing every program activity for virus characteristics. When the program detects an attempt to infect your software, *PC-cillin* captures the offending code, protects all programs on your disk, and issues an on-screen warning with instructions. *PC-cillin* also ships with the Hardware Immunizer—a modified D-type, 25-pin connector that fits between the parallel port and the printer. The Hardware Immunizer stores the crucial data from the hard disk's boot sector.

List Price: *PC-cillin*, \$139. **Requires:** 8K RAM, DOS 2.1 or later. Trend Micro Devices Inc., 2421 W. 205th St., #D-100, Torrance, CA 90501; (213) 782-8190.

CIRCLE 447 ON READER SERVICE CARD



VirusSafe

EliaShim Microcomputers announces a TSR that detects and neutralizes most known viruses and warns of new viruses that attempt to infect your system. *VirusSafe* scans all disks, looking for active and dormant viruses, then removes the most common ones. For important file programs and boot sectors, *VirusSafe* calculates a digital signature then scans for changes. If a problem is detected, *VirusSafe* helps reconstruct the infected area.

List Price: *VirusSafe*, \$80; *VirusSafe LAN*, \$249 for 8 users, \$495 for 25 users. EliaShim Microcomputers Software and Hardware Systems Inc., 520 W. Hwy. 436, #1180-30, Altamonte Springs, Fla.; (407) 682-1587.

CIRCLE 448 ON READER SERVICE CARD



AntiVirus-Plus

Techmar Computer Products offers a pair of memory-resident programs designed to detect both known and most unknown viruses. During installation, *AntiVirus-Plus* creates a series of signature files specific to program files on the computer. When the program detects a known virus, it identifies it, removes it, then restores the infected files. When *AntiVirus-Plus* detects an unknown virus coming into your system, it warns you, prevents the infected data from entering your memory, and remembers the pattern for future recognition—in effect, becoming smarter as you use it.

List Price: *AntiVirus-Plus*, \$99.95. **Requires:** 20K RAM, hard disk, and DOS 3.0 or later.

IMPROVED

Pizzaz Plus, Version 2.0—Application Techniques announces that its image-capture utility can now capture, print, and export full-color Windows 3.0 screen images. Captured images can be sized, cropped, and rotated. *Pizzaz Plus* even allows users to save Windows clipboard images. Screen images may be saved as .PCX files and imported into *PC Paintbrush* for editing. *Pizzaz Plus* also adds support for Super VGA display adapters, Truevision TARGA, the HP PaintJet XL, and for NEC, QMS, and Tektronix color PostScript printers. *Pizzaz Plus* is memory resident, occupies 32K RAM, and retails for \$149. Upgrades are available for \$29.95 from Application Techniques Inc. in Pepperell, Mass. at (800) 433-5201 or (508) 433-5201.



Pizzaz Plus lets you crop, shade, and position images before you print them.

CA-Cricket Presents, Graph for Windows—Computer Associates announces that both its graphing and presentation packages support Windows 3.0. *Presents* offers a series of user-customizable layout templates designed to produce professional-looking graphics presentations. With the Auto Presents feature, you merely prepare an outline, select a template and the package automatically transforms those ideas into a presentation. *Presents* also includes an editing toolkit for creating your own templates. *CA-Cricket-Graph for Windows* users can either enter data directly into *Graph* or import data from their word processor, spreadsheet, or database files. The package transforms that data into a fully customizable graph. Users can choose from scatter, line, scatter bar, pie, double Y-axis, polar, column, text, area, stacked column, bar, and overlay combinations. *Graph* provides control over data window formatting, supports up to 40 columns and 2,700 rows of data, and performs mathematical data operations, functions, and expressions. *Graph's* customizing features include 16 bar patterns, 48 plot symbols, 2-D and 3-D graph manipulation, regression curve fits, error bars, grids, and full-color control. Both packages import TIFF, .PCX, .GMF, .CGM, .EPS, .DIF, .WKS, SYLK, or ASCII text files. *CA-Cricket Presents for Windows* retails for \$495, *CA-Cricket-Graph for Windows* retails for \$195 from Computer Associates in Garden City, N.Y. at (800) 531-5236.

CONTINUES ON PAGE 58

Techmar Computer Products Inc., 97-77 Queens Blvd., Rego Park, NY 11374; (800) 922-0015 or (718) 997-6800.

CIRCLE 449 ON READER SERVICE CARD

Two New V.42 9,600-bps Modems

NEW

PM 9600 SA

For \$699, Practical Peripherals introduces the PM 9600 SA V.42bis modem. Supporting V.32, V.42bis, and MNP Level 5 error correction protocols, the PM 9600 SA is compatible with all domestic modem types and automatically corrects its connection mode to match the remote modem. Other features include user-selectable tone or pulse dialing, secondary dial tone detection, and the ability to store four user-defined phone numbers.

List Price: PM 9600 SA, \$699. Practical Peripherals, 31245 La Baya Dr., Westlake Village, CA 91362; (818) 706-0333.

CIRCLE 450 ON READER SERVICE CARD

SM-96MV

GVC Technologies introduces the SM-96MV, its 9,600-bit-per-second V.42/V.32 modem with MNP Level 5 data compression and error correction. The SM-96MV is backward-compatible with MNP Level 4, 3, and 2 modems and features call-back security which guards against unwanted users.

List Price: SM-96MV, \$699. GVC Technologies Inc., 99 Demarest Rd., Sparta, NJ 07871; (201) 579-3630.

CIRCLE 450 ON READER SERVICE CARD

File Management That Makes Sense

NEW

Ready, Aim, File! from VSoft is a menu and file management system that frees users from traditional DOS directories and subdirectories. With *Ready, Aim, File!*, files are application independent. Users place their files within

CONTINUES ON PAGE 58



Make Powerful Connections with Borland's New Paradox

By any standard, Paradox® is the most powerful database. That's why it's been rated #1 by every leading computer publication, and why hundreds of thousands of users worldwide have switched to Paradox.

Now there's another reason to switch to Paradox—it **connects**.

Now Connects With SQL

Paradox makes it easy to connect PCs to the networks and SQL servers of your choice*. No programming is required. Users don't need to learn SQL. And since LAN traffic is kept to a minimum, answers to queries are delivered FAST!

All the power and ease-of-use of Paradox now transparently connect with your SQL data, including: Query By Example, multi-table forms and reports, presentation-quality graphics and much more.

Connects With Programmers

Paradox includes a full-development language (PAL™) for building complete database applications. And now, with Paradox SQL Link, programmers can integrate SQL statements into PAL programs, use SQL table cursors, trap server error codes, and tap the unique capabilities of different database servers.

Connects with the Full Power of Your PC

Paradox 3.5 incorporates VROOMM™ and Turbo Drive™. These proprietary Borland technologies let Paradox

automatically optimize your computer's use of available memory, and access up to 16Mb of RAM on 286/386/486 PCs. The result is lightning-fast database performance on any PC.

dBASE Owners! Connect for Only \$149⁹⁵

At \$795, Paradox is the best database value around. And to introduce its power and connectivity to dBASE® users, we're making an outrageous offer: If you own any version of dBASE, we'll sell you Paradox for only \$149⁹⁵†. Paradox will read and write dBASE files for easy integration into your existing environment.

Upgrade to Paradox 3.5 Now.
See your dealer or call
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B O R L A N D

Makers of Paradox®, Quattro® Pro, Turbo C++, Turbo Pascal® and Sidekick®

CIRCLE 287 ON READER SERVICE CARD

Code: MX79

*Microsoft, IBM and Oracle servers supported now. DEC Rdb connectivity will be available in the first quarter of 1991. †Offer also good for owners of any version of RBase or dBase. Proof of ownership (a page from the manual) is required. Satisfaction guaranteed or your money back. Mail orders to: Borland International, Inc., P.O. Box 660001, Scotts Valley, CA 95067-0001. Add \$5.00 for shipping and handling. Residents in CA, CT, GA, IL, MA, MI, NY, OH, PA, TX, VA and WA please add appropriate sales tax. For orders outside the U.S. call (408) 438-5300. Paradox and Turbo Language are trademarks of Borland International, Inc. Copyright © 1990 Borland International, Inc. All rights reserved. B1 1389A

New&Improved

File Management

CONTINUED FROM PAGE 56

folders, and each folder represents a different project, client, or subject. This way, all files pertaining to a specific folder can be kept together, whether they are documents, spreadsheets, or graphics files. When you click on a file, the corresponding application loads automatically.

List Price: *Ready, Aim, File!*, \$89.95.

Requires: 640K RAM, DOS 3.3 or later.

VSoft Systems Inc., 279 S. Beverly Dr., #318, Beverly Hills, CA 90212; (213) 858-3941.

CIRCLE 661 ON READER SERVICE CARD

American Heritage Documented On-line

NEW

Houghton Mifflin touts its *American Heritage Electronic Dictionary* as "a sophisticated reference and writing tool." Beyond working as a memory resident dictionary for word processing, *AHED* acts as a database for its 116,000 words. By using SearchText, users can type in "white AND tree," and *AHED* will produce a list of white trees. Other features include: definitions, the ability to insert words into documents, spelling, hyphenation, proper usage, synonyms, inflections and idioms, Wildcard and Anagram functions, as well as *Roger's II*, a 42,000-word electronic thesaurus.

List Price: *The American Heritage Electronic Dictionary*, \$89.95. **Requires:** 140K RAM, 3MB hard disk space, DOS 2.1 or later.

Houghton Mifflin Co., One Memorial Dr., Cambridge, MA 02142; (800) 633-4514.

CIRCLE 662 ON READER SERVICE CARD

Portable Data Acquisition

NEW

Data Translation's DT2814 analog input board promises reliable analog signal capture, conversion, and analysis in a laptop. In the past, analog data acquisition boards could not work in laptops because they required -12v power. The DT2814 incorporates a charge pump which generates the -12v power from the laptop's power supply. The DT2814 utilizes power-thrifty CMOS circuitry, provides 16 channels of single-ended analog inputs with 12-bit analog-to-digital conversion, and promises throughput to memory at rates up to 40 kHz.

List Price: DT2814, \$345. Data Translation, 100 Locke Dr., Marlboro, MA 01752-1192; (508) 481-3700.

CIRCLE 663 ON READER SERVICE CARD

IMPROVED

CONTINUED FROM PAGE 56

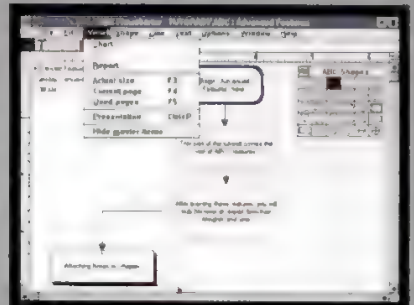
Microsoft Word for Windows, Version 1.1—*Word for Windows* now takes full advantage of the *Windows* 3.0 graphics environment. Version 1.1 provides new macro functionality, including a new mail-merge macro, a paragraph shading macro, and a legal brief template. Improvements in file conversion promise greater portability to other PC applications, and also allow *Word for Windows* users to read from and write to Macintosh *Word* format. *Microsoft Word for Windows*, Version 1.1, retails for \$495; registered users can upgrade for \$7.50. Microsoft Corp. is based in Redmond, Wash. at (206) 882-8080.

Ami Professional, Ami, Version 1.2—While maintaining full compatibility with *Windows* 3.0, Samna Corp.'s professional word processor adds support for Hewlett-Packard's *NewWave* 3.0. Version 1.2 takes advantage of *NewWave*'s "agent" capabilities which allow users to build compound documents out of spreadsheets, drawings, and even full-motion video. Samna announces that *Ami*, Version 1.2, now works under *Windows* 3.0. Other features in Version 1.2 include: footnotes, nonprinting notes, mail-merge, macro recording and playback, support for DDE protocols, enhanced import/export filters, the ability to anchor frames, and greater control of page numbering. *Ami Professional* 1.2 for *NewWave* and *Windows* 3.0 retails for \$495, upgrades are \$10. *Ami* 1.2 retails for \$199, upgrades are \$49 from Samna Corp. in Atlanta, Ga., (404) 851-0007.

WordStar, Version 6.0—*WordStar*'s word processor now offers greater printer control. Version 6.0 has added support for over 30 new printers, and can exploit LaserJet III and PostScript special effects by allowing patterns and shading to be assigned to fonts. For scalable fonts, users can specify point sizes from 2 to 999 on the fly. Other features include support for: four different math symbol sets, kerning, code pages, auxiliary foreign language dictionaries, user-selectable unit measurements (inches, columns, centimeters, and points), and an enhanced file conversion utility. *WordStar*, Version 6.0, retails for \$495, upgrades are \$89 from WordStar International Inc. in Novato, Calif., (800) 227-5609.

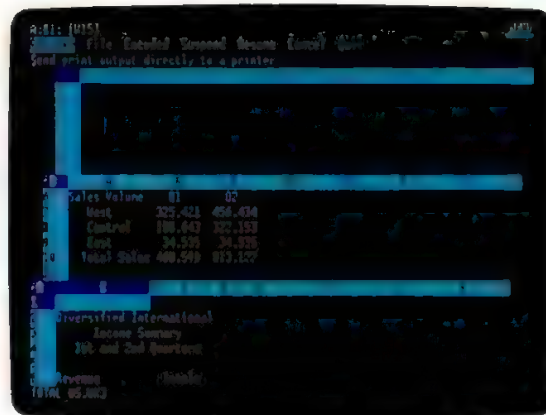
Definitions Plus!, Version 2.0—WordScience's electronic dictionary cuts its memory-resident RAM portion from 94K to 4K. Version 2.0 occupies 2.3MB of hard disk space and provides the full text of the *American Heritage Dictionary*, including the more than 115,000 words, all usage notes, and sample sentences. Other features in Version 2.0 include: EMS support, the ability to swap to the hard disk, *DESQview* compatibility, and an optional nonresident mode. Version 2.0 can also work directly within existing electronic thesauruses and spelling dictionaries. *Definitions Plus!* retails for \$99.95. Upgrades are \$29.95 from WordScience in Concord, Calif. at (415) 685-2025.

ABC Flowcharter, Version 1.1—Roykore's WYSIWYG flowcharter now operates under *Windows* 3.0. Version 1.1 can link shapes in one chart to more-detailed subcharts, implement text searches, scroll the screen at any angle, and view charts in presentation view (minus menus and scroll bars) for desktop presentations. *ABC Flowcharter* retails for \$295; registered users can update for free. Contact Roykore Inc. in San Francisco, Calif. at (415) 563-9175.



LabelPro Dot Matrix—Avery has released a version of *LabelPro* that works with dot matrix printers. *LabelPro Dot Matrix* allows users to print a variety of labels in black and white or in color; import .PCX files; and access database and word processing files. The dot matrix version provides two typefaces, Times New Roman and Arial, in font sizes from 6 to 96 points. *LabelPro Dot Matrix* retails for \$99.95 from Avery in Corvina, Calif. at (800) 541-5507.

Lightning, Version 5.5—DacEasy's disk caching program now features Disk Watch, a color-coded screen indicator that shows the number of disk accesses as they occur. Other new features include: the ability to specify a buffer up to 8MB of conventional, extended, or expanded memory; compatibility with DOS 4.0; and support for drives larger than 32MB. Suggested retail price for *Lightning*, Version 5.5, is \$29.95. Contact DacEasy in Dallas, Tex. at (214) 248-0205.



*According to Lotus' technical support, you cannot view a graph while in perspective mode in 1-2-3.

Borland's Quattro Pro vs. Lotus' 1-2-3

Quattro Pro is radically different from Lotus' 1-2-3.* Even if you use Quattro Pro's menu builder and load the optional 1-2-3.MU demo file as shown above.

More than 300,000 spreadsheet users have now switched to Quattro Pro. They prefer its innovative features, including advanced graphics with slide show capabilities, complete drawing program, mouse support, linear programming, huge spreadsheet capacity afforded by its unique VROOMM™ technology, and its ability to read existing 1-2-3 files. And much more.

Quattro Pro has won every significant "best spreadsheet" award and product review to date:

Quattro Pro Awards

- Technical Excellence Award
1989—PC Magazine
- Spreadsheet Product of the Year
1989—InfoWorld
- Software Product of the Year
1989—InfoWorld
- Top-rated, High-End PC Spreadsheet Review
1990—InfoWorld
- Most Valuable Product (MVP)
1989—PC Computing
- Award of Distinction
1989—BYTE
- Best Buy & Top-Rated Spreadsheet
1990—PC World
- 1989 Software Product of the Year
PC User (UK)
- High-End Spreadsheet Editor's Choice
1990—PC Magazine
- Best Numeric Business Application Award
1989—Software Publishers' Association
- Top-rated, Consolidation Spreadsheet Review
1990—PC Week
- Readers' VIP Award, Spreadsheet Category
1990—BYTE (first for first)

At Borland, we believe in software craftsmanship and are fighting for your access to *real* innovation.

*Quattro Pro's default menu structure is CUA- and SAA-compatible like most of the new software that you'll buy in the '90s. Thanks to Borland's revolutionary VROOMM technology, Quattro Pro sports a modern graphical user interface and runs on today's hardware.

Judge for yourself

If one screen isn't enough, compare the rest of them.

That's why we're offering Quattro Pro to any 1-2-3 user** for only \$99⁹⁵.

We'll send you the complete package (regularly \$495*) with our customary 60-Day, Money-Back guarantee. We'll even bill you later if you'd prefer.

Order your own copy now and judge for yourself.

Call NOW 1-800-331-0877.

Also available at participating software dealers, or by mailing this coupon to:

Borland Quattro Pro Offer
1800 Green Hills Road
Scotts Valley, CA 95067

☒ **YES, send me Quattro Pro for only \$99⁹⁵.†† I'd like to see for myself the product that Lotus is so worried about.**

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**Proof of ownership—an original manual page or disk—is required. Offer good in United States and Canada only. *Suggested retail price. ††Add 85¢ shipping & handling plus local taxes where applicable.

Code M094

B O R L A N D

CIRCLE 285 ON READER SERVICE CARD

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How did anyone WordPerfect

For years now, people have been searching for a better way to communicate. Where information is shared and a diversity of

And with WordPerfect Office Connections™, you're not limited to one department or division. You can link your networks together for an enterprise-wide solution.

ideas can flow. It's a simple concept, really. Keeping it simple, however, takes a powerful solution.

Introducing a family of productivity products that finally connect with the way companies work. Introducing WordPerfect Office™ 3.0.

It's all on the menu. WordPerfect Office starts with a shell menu that's easy to relate to and even faster to use. Instead of having to exit to a DOS prompt, the WordPerfect Office 3.0 shell lets your people jump between the programs they use most, like spreadsheets, and word processing.

The stand-alone version, WordPerfect Office PC, provides you with a Calendar, Notebook, Calculator, Program/ Text Editor and File Manager to keep organized. The network version, WordPerfect Office LAN, also comes with E-Mail and Scheduler to keep in touch.

In Box			
Dave Clara	06/23 09:17	Office 3.0 Update	
Wendy Mulbrook	06/23 09:18	Printer Manual Deadline	
Dave Clara	06/23 09:18	Office Publications Meeting	
Dave Clara	06/23 09:19	** FORWARDED: SUBJECT **	CC
Steve Knudsen	06/23 09:21	Slides For Condon	
Steve Knudsen	06/23 09:22	Condon	
Out Box			
Mail message	WCAV	4018 Question	
Forwarded mail	stevan	tones no Reply -Forwarded	
Mail message	dave	Office 3.0 screens	
Forwarded mail	abine	tones no Reply -Forwarded	

Tab Out Box: F1 Update; Shift-F1 Setup; F3 Help; F7 Exit
2 Read; 3 Delete; 3 Save; 4 Info; 5 Group; 6 Mail Mag; 7 Phone Mag; 1

E-Mail. A package that delivers. In practically no time at all, you can circulate a message to the people you choose, or to the entire corporation. And you can deal with information when you're ready.

E-Mail brings you and your company face to face with the power to send messages,

E-Mail
WordPerfect documents or up to 100 attached files of any format. You can send a carbon or blind copy or keep your messages confidential by using password protection and encryption.

And if you're worried about something you may have said, don't worry. E-Mail even gives you control over messages that have been sent. It lets you see when a message



ever communicate before Office 3.0?

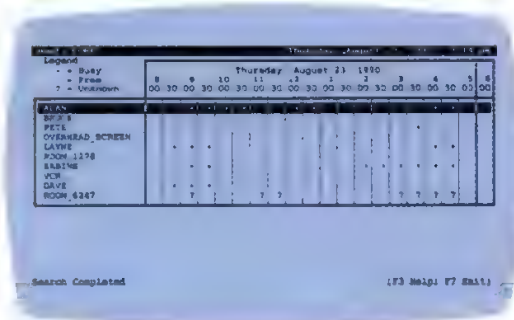
has been delivered, opened or deleted. Then it lets you retract it, change it and send it back again.

A change in schedules. Sometimes it takes more than E-Mail for people to finally get the message. With Scheduler, people, meeting rooms and resources can quickly come together. All you have to do is list and select the names and resources you need. Scheduler shows you when your room and equipment are free and lets you compare blocks of time when your people can meet.

Gateways to other worlds. If you're beginning to see how WordPerfect Office can bring your company together, imagine how it can connect you to other worlds. Gateways between remote sites, public mail services like MCI, Western Union EasyLink, and standard messaging systems like X.400, MHS and PROFS are soon

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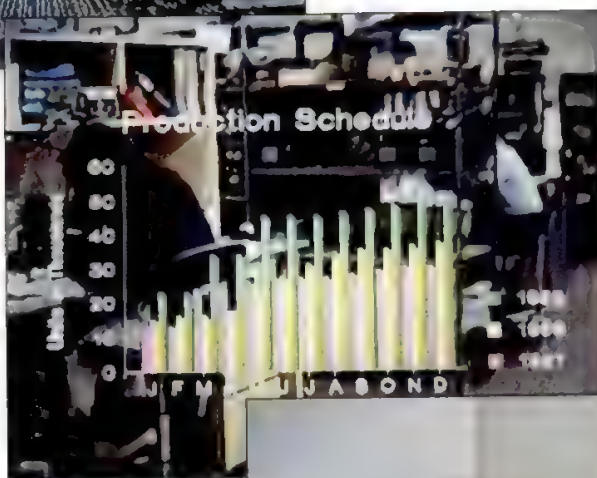
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edited by
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Read Only

Reviews of the Latest Books for the PC User

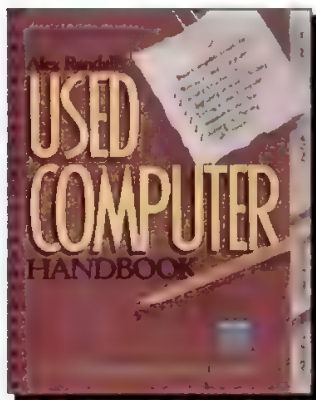
How to Upgrade, Sell, or Give Old Equipment Away

■ *Alex Randall's Used Computer Handbook*

by Alex Randall

Microsoft Press, \$14.95

Alex Randall's handbook initiates readers into the world of buying and selling used equipment, a world Randall and his wife, Cameron Hall, should know well: they were



Alex Randall's book gives helpful advice to buyers and sellers of used PCs.

cofounders of the Boston Computer Exchange in 1982. Randall views computers as commodities rather than as pets we maintain till death and then bury. Though clearly enthusiastic about PCs and their positive effects on our lives, Randall thinks in practical terms and suggests that we buy and sell our PCs with the same financial responsibility we exercise when trading in our car.

This approach leads to a couple of important conclusions. Since a souped-up XT tends to fetch little more on the market than a stock XT, he advises against excessive upgrading. It doesn't make good financial sense. Second,

Randall seems to recommend buying only name-brand machines: plenty of buyers may be interested in a three-year-old IBM AT, but nobody wants to put down good money for a three-year-old Gunther Turbo Special.

Randall goes on to discuss the factors that determine the fair market value for used machines; the relative merits of various channels for finding buyers and sellers, including such offbeat channels as pawn shops, auctions, and university bulletin boards; how to test drive a used computer quickly; strategies for successfully arriving at a fair deal for both buyers and sellers; and tips for protecting oneself financially during the transaction.

The final two chapters of the book address issues of corporate computer trading and the possibility of giving away computers to benefit from the resulting tax breaks. As with the rest of the book, Randall discusses strategies for both buyers and sellers, givers and receivers.

Each chapter begins with an anecdote gleaned from his international travels and experiences with the Boston Computer Exchange. Most chapters end with some tips listed under the heading of Randall's Rules. While this can seem a bit self-indulgent at times, most of the anecdotes are interesting, pertinent, and amusing.

Those who are open to the idea of buying or selling used equipment will benefit by sitting down for a few hours with this well-written, well-designed book. As computer books go, *Alex Randall's Used Computer Handbook* makes for pleasant, interesting reading. More important,

you'll benefit from the insights and strategies of someone who's been dealing in used personal computers for about as long as the IBM PC has existed.—**Mitt Jones**

Alex Randall's Used Computer Handbook

Microsoft Press, Redmond, WA
98052-6399; (800) MS-PRESS.
ISBN 1-55615-267-1

CIRCLE 306 ON READER SERVICE CARD

■ *IBM Personal Computer Upgrade Guide*

by Tom Badgett, Corey Sandler, and Jim Terry

Howard W. Sams & Co., \$24.95

The IBM Personal Computer Upgrade Guide addresses the issue of system obsolescence with an age-old answer: upgrade your system from the motherboard up. At first glance, Tom Badgett, Corey Sandler, and Jim Terry's book seems to be a hobbyist's dream come true. The table of contents includes promising chapter titles such as "Upgrading Software," "Real-World Scenarios: Step-by-Step



Makeovers," and "How to Build a PC from Scratch." Alas, what seems to be a good idea quickly turns

sour. The book suffers from a number of serious faults, the most obvious being a smattering of fundamental errors. In chapter two, for instance, we are told that CGA monitors are capable of one color and that VGA monitors operate at a resolution of 528-by-480 pixels when displaying 256 colors.

While the authors go on to define a PC's memory a bit better, references to expanded and extended memory as

"segments of memory" and "memory areas" will only confuse the people they are trying to educate. The authors also fail to make any careful distinction between memory above 640K and memory above 1MB and use the two interchangeably in some cases.

Inexcusably, the book lacks focus and depth. A Howard W. Sams representative reported that the *IBM Personal Computer Upgrade Guide* is intended for more-experienced computer users, yet no experienced user is likely to learn much from this book, and novices will be no better served. Technical explanations fail to rise above the superficial, and the step-by-step procedures for installing and removing equipment are far too abbreviated to be truly useful.

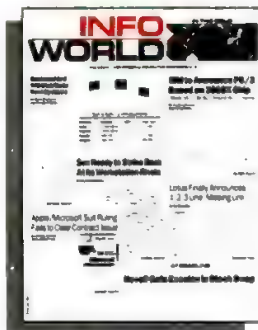
The book also commits indiscretions such as listing part numbers and prices from the Jameco Electronics catalog with its upgrade examples. While Jameco is a fine distributor of computer components, this favoritism seems questionable.

There isn't enough room here to discuss the remaining problems with this book. Suffice it to say no one, whether a novice or an expert, is likely to glean enough information from this book to make the effort of reading it worthwhile. If you see the *IBM Personal Computer Upgrade Guide* at the bookstore, try not to give in to the allure of its title and table of contents.—**M.J.**

IBM Personal Computer Upgrade Guide

Howard W. Sams & Co., Carmel, IN
46032; (317) 573-2500.
ISBN 0-67222-723-1

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by
Gus Venditto

Pipeline

A Look at the Trends Shaping the Personal Computer Market

New Idea in Graphical Interface: Tight Code and Small RAM Requirements

It may seem like every software publisher is hell-bent on moving its applications to graphical environments that require 286 and 386 PCs.

In reality, they're all merely trying to find out where the market's headed and make sure they have programs ready when the market arrives.

Over the next year, we'll all find out if there's a healthy market for a graphical environment running on an 8088 PC.

A small software company in Berkeley, California, called GeoWorks (until recently, Berkeley Softworks) has been quietly perfecting just such an environment. Called GEOS, it has its roots in software developed to provide the Apple II with a graphical interface.

GeoWorks is now ready with PC/GEOS, a version of GEOS that looks a lot like *Windows* and provides multithreaded, multitasking program execution and runs smartly on every kind of PC from an XT on up.

It's certainly not a clone of the *Windows-OS/2* Presentation Manager, but it does follow the SAA guidelines for common-user access, so you'll find a file menu in the upper left corner, and you'll use scroll bars and arrows in very much the same way. In fact, the GEOS interface can be swapped, so you can actually choose a *Windows-OS/2* look for one application and a *Motif* look for another application running at the same time.

It runs on top of DOS (you can shell out to DOS's com-

mand prompt) and it comes with its own group of accessories (notepad, calculator, calendar, et al.). But publishers will have to develop GEOS-specific versions of applications to get them running in GEOS's environment.

That may not be as daunting a challenge as it sounds. Programmers will get a fairly robust set of tools for developing programs, so porting existing applications to GEOS should prove far easier than porting to *Windows* or *OS/2*. Lotus is among the companies already exploring the platform.

And since PC/GEOS was written with an eye for the requirements of memory-constrained computers, the potential for GEOS becoming the graphical standard on laptops and PCs designed for home users is very strong.

It's due out in a few weeks and will be reviewed in *First Looks* shortly. It will also be discussed in Bill Machrone's column next issue.

New Ideas for PCs Debuting on NeXT Computer?

The NeXT cube may finally be ready to replace the Mac as the showcase for new ideas that are destined for DOS machines.

One of the NeXT's greatest selling points is supposed to be the tight integration of the machine and software development tools. Yet until now, very few new ideas have emerged on the platform.

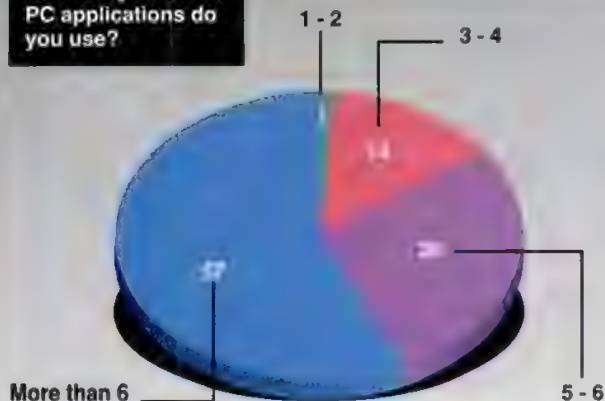
Lotus's announcement of *Improv*, an advanced spreadsheet that will run on NeXT, may be the first sign of an important development originating on the machine.

Improv steals some database techniques to make a spreadsheet more flexible. It looks like a spreadsheet, but it goes beyond the traditional designation of a spreadsheet cell as a "row:column" address by reading the actual labels that the user enters. It then treats those labels as though they were field names

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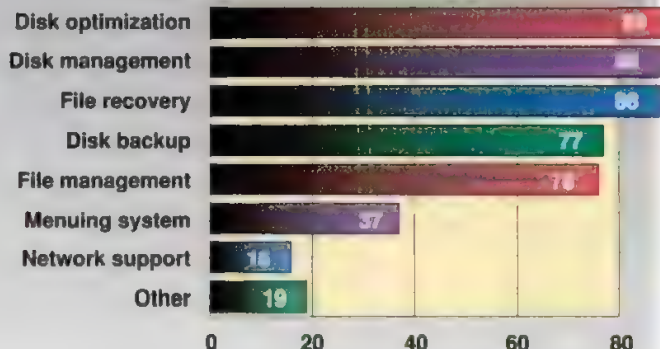
SURVEY

In an average week, how many different PC applications do you use?



With software sales doing well at every level, and new utilities sprouting up every day, we thought it appropriate to ask callers to PC MagNet about the range of programs they use. Disproving a common myth, the callers tended to say they use far more than two or three applications. Most respondents said they use more than six programs every week—and were still looking for more.

For what purpose do you use utility software?



Pipeline

CONTINUED FROM PAGE 65

for the underlying figures and formulas.

The program establishes and then maintains the relationships among the rows and columns while letting you change the way you look at the figures.

At its simplest level, that means you can take a standard arrangement of 12 months that are totaled and insert quarterly figures. *Improv* will let you insert the quarterly totals without affecting the annual totals because it's already established the relationship among the months; the fact that quarterly totals interrupt the series will not require editing formulas and moving columns.

Taking the concept to its extremes, that means you can take a standard spreadsheet and collapse categories, as though it were an outliner. You can rearrange budget categories at different levels of a spreadsheet.

Lotus is not yet saying it will develop a version of *Improv* for the PC, but if the product finds an audience, it's very likely to happen.

At the very least, Lotus hopes that *Improv* will prove that the company can still create exciting technology at a time when *1-2-3* is receiving only modest enhancements.

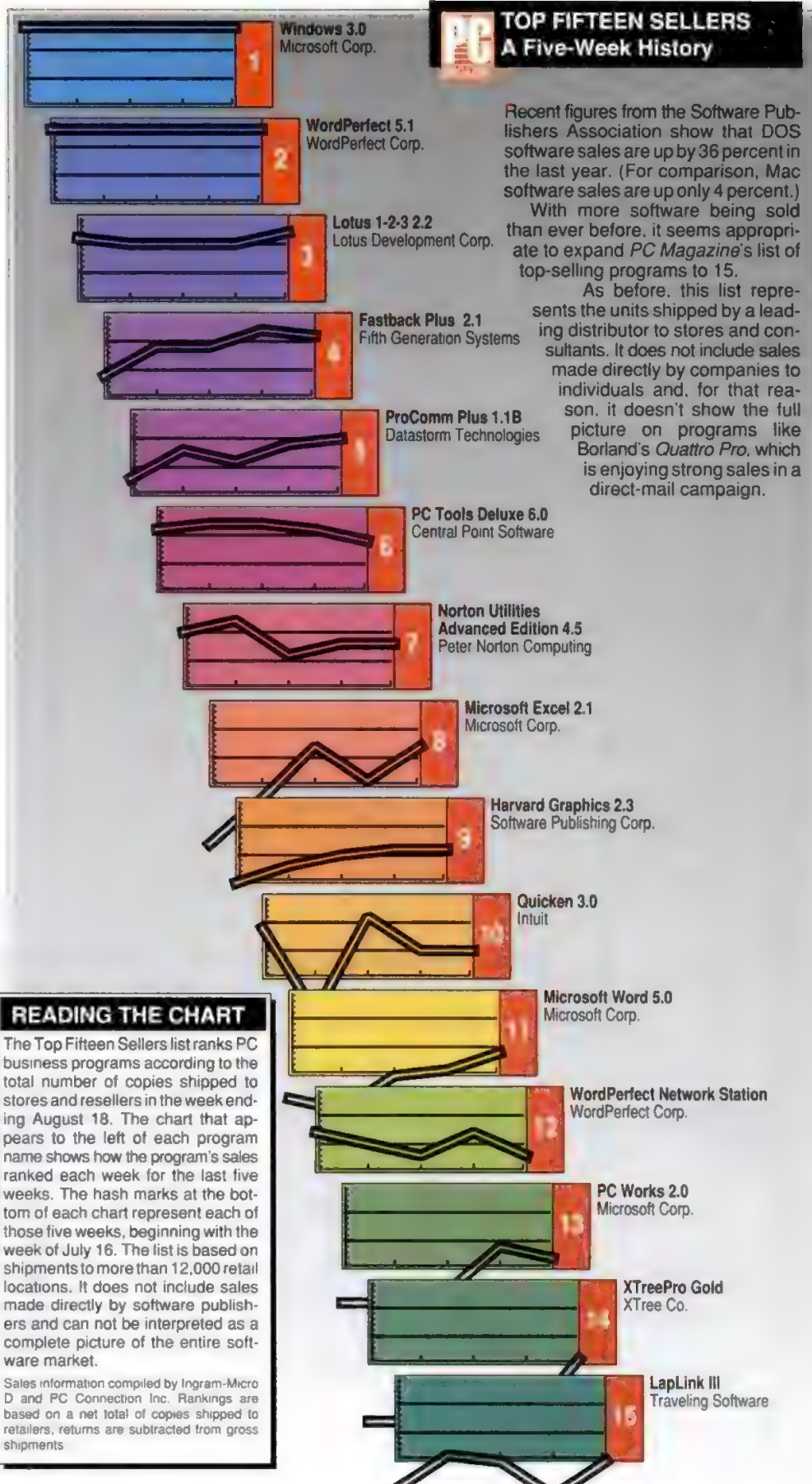
Concern Over Monitor Emissions Will Lead to New Low-Frequency Models

The threat from monitor emissions is far from clear, yet most monitor manufacturers are making plans to introduce displays with reduced levels of low-frequency emissions.

IBM took the lead last year by announcing monitors designed to meet the most stringent electromagnetic emissions standards, standards established by the Swedish government.

Sales of such monitors have not been strong, but other manufacturers are quietly developing models that also conform to the Swedish standard. Taxan, for example, plans to introduce extra shielding and a more-effi-

CONTINUES ON PAGE 69



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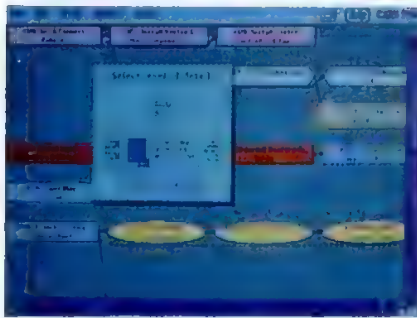
ZOOM!

CLICK!

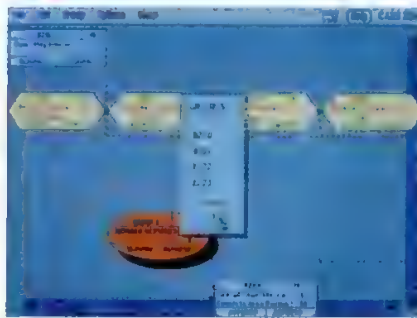
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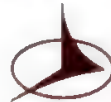
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CONTINUED FROM PAGE 66

cient yoke in new models. These monitors will sell at a premium over existing displays with the same features.

When *PC Magazine* Labs tested popular monitors last year, the levels of emissions were found to be well within safe standards—when the user remained outside of a range of six inches. (See "The Big Question: Is the PC Environment a Safe Place to Work?" December 12, 1989.)

New Opportunities for Technical Training

Large computer companies typically offer training programs only for dealers and consultants who are authorized to sell their computers to the general public. Corporations generally have to rely on independent training schools to bring their technicians up to speed.

The fastest growing companies made their reputation by providing reliable service; the next frontier may be programs that help users understand those systems.

Dell, which effectively cut away the middleman for selling PCs years ago, is now forming classes for interested owners of Dell PCs.

The Self-Maintainer Program provides several days of classroom and hands-on instruction, complete with extensive technical documentation.

At the same time, Dell's begun the TechFAX service, an 800 number that anyone can call to get technical diagrams on specific problems. While most of the answers deal with Dell equipment, some of the topics covered include SIMM (single in-line memory module) replacement and pin designations for

standard cables.

Educational services from manufacturers has the potential to become very popular. In recent years, the fastest growing new companies made their reputation by providing reliable service. The next frontier may prove to be programs that help users better understand those systems.

New Avenues for Continuing Education

One of the most ambitious uses of PC to PC communications is getting underway this fall.

The University of Phoenix is offering several bachelor's and master's degree programs completely through electronic mail.

Students will receive lectures as downloadable text, will post questions to their professors as e-mail messages, and will turn in assignments as uploaded files.

The curriculum includes an MBA or BS in business administration and an MS in organizational management. (Call (602) 971-7170 for details.)

New Ways to Benefit from PC Magazine (Accountants Only)

If you're an accountant and you read *PC Magazine*, you're eligible for free course credits. That is, if you enroll in a continuing education course and can pass a multiple-choice exam based on recent issues.

The course is offered by a Dallas, Texas, firm, CPA Computing (817) 430-4866, which offers continuing education programs. The course consists solely of a 75-question test and is given quarterly.

Unfortunately, familiarity with John Dvorak's column alone would not be sufficient for a passing grade. ■

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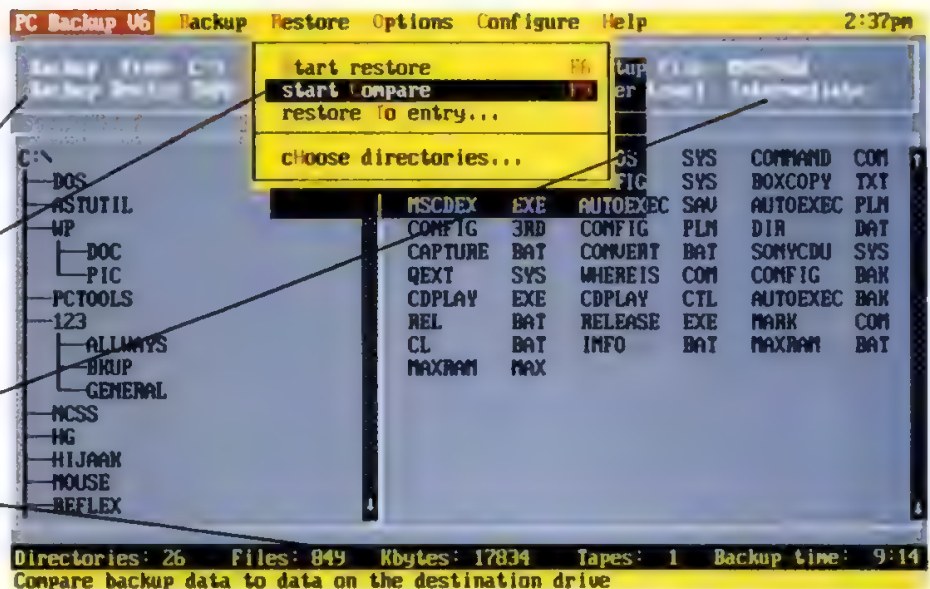
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— InfoWorld, May 8, 1989

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— PC Magazine, Jan. 16, 1990

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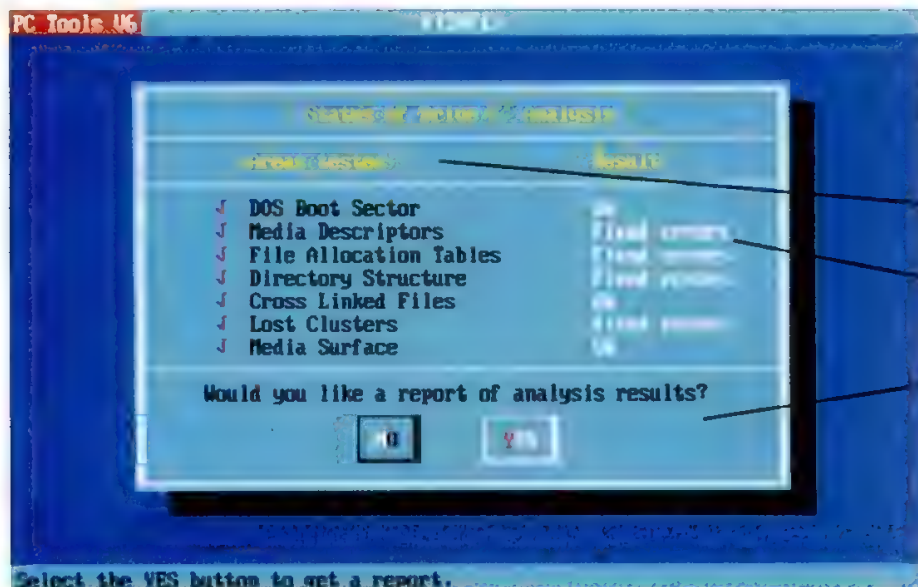


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Ed Mendelson, PC Magazine "Best of 1989 Awards," January 16, 1990



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— InfoWorld, Dec. 18, 1989

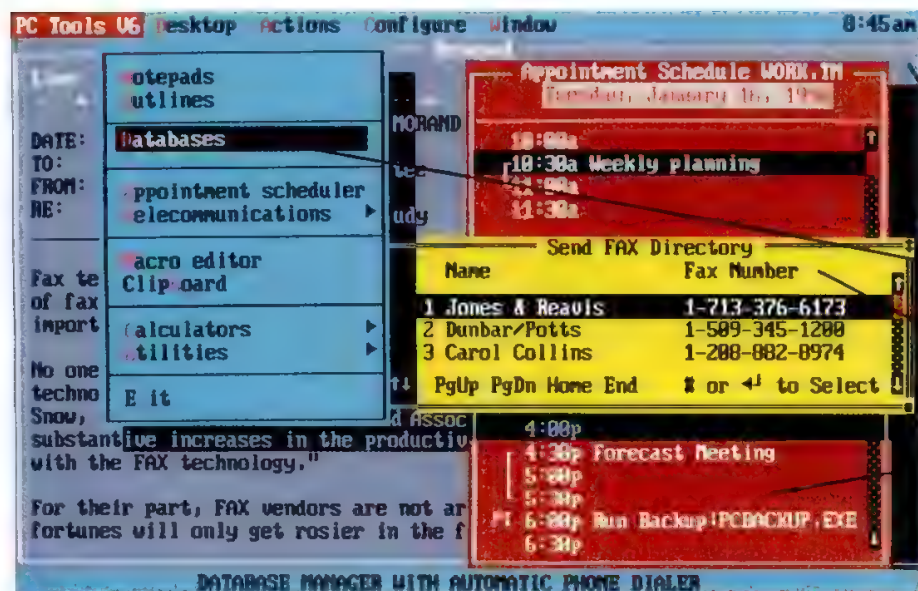
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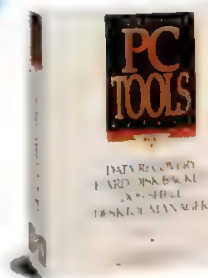
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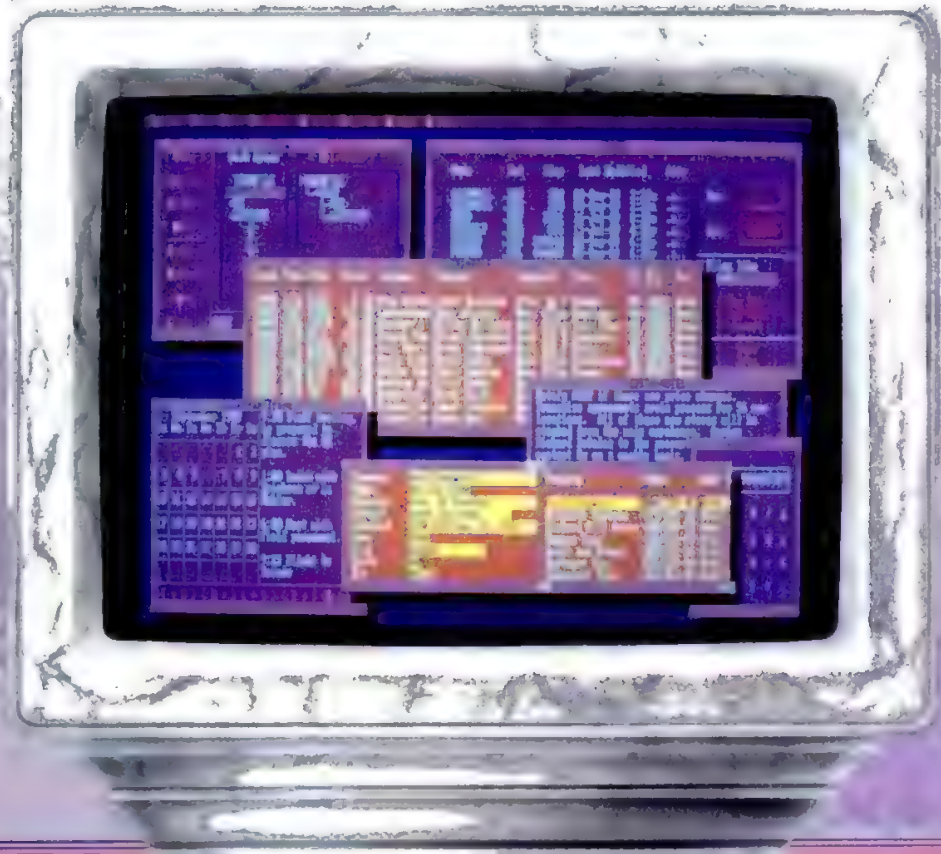
System Requirements: FoxPro operates in 512K RAM (640K recommended) with MS/PC-DOS 2.0 or greater and an 8086/8088, 80286 or 80386 microprocessor. For optimum performance, FoxPro takes complete advantage of any available EMS (expanded memory) or a math coprocessor.

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Bill Machrone



All in a Day's Work

We are all subjected to an almost-endless barrage of new products. Here's how we cope at PC Magazine.

My mother doesn't understand what I do for a living. She knows I travel a lot, because I'm always getting home from some far-flung city at some weird hour. Mom knows it has something to do with computers, because she calls me up every time IBM has a staff reduction or its earnings drop:

"Bill, is your job okay?"

"I don't work for IBM, Mom."

"But so many people are losing their jobs..."

"New companies are starting up all the time, Mom."

"But I never read about them!"

Precisely. And that is exactly why we're continually beating the bushes, looking for new companies and products. Mom doesn't understand why we fly all over

the country. Why couldn't we just stay home and let people come to us? We'd miss out on a lot of good products if we did. Five years ago, *PC Magazine* invented a kind of forum for manufacturers that we call Editor's Days. Here's how it works: We come into town (about 40 of us; it looks like an invasion) and rent a bunch of suites in a good hotel to which we've previously invited regional hardware and software vendors. They come in for scheduled appointments with editorial teams who specialize in their products. They get to demo. We get to ask questions. We see numerous new products under nondisclosure, so that we can be up to speed on them when they ship and it's time to write the review.

Nearly a quarter of the companies we bring into Editor's Days are newcomers. They don't have a public relations firm, they're not advertising yet, but they've got a new product and a dream. It's critical that we invite these companies, since many of them are unfamiliar with the ins and outs of getting their products covered. We'd be seriously remiss if we sat back in our ivory towers in New York and waited for them to come to us. We'd also get a grossly distorted view of the market.

Even trade shows, where you supposedly get to see everything, don't cut it. First off,

manufacturers go to trade shows primarily to line up dealers and customers. The chaotic conditions on the show floor are hardly conducive to a reasonable demo and a conversation about the product's features. Further, the hordes of editors and reporters who cover these events can be a detriment to the conversations we want to have with vendors, because each publication has its own interests and points of view. Finally, going to a trade show is expensive. Lots of small companies can't afford it. It costs nothing for them to come to an Editor's Day, where they and we are guaranteed a confidential meeting.

At a recent Editor's Day, we had eight editorial teams, each with eight appointments. My team saw a wide range of products, from Cheyenne Software's device-independent backup and archiving software, to the ultimate product for the news junkie: Dow Jones's *DowVision* offers seven different newswires, from the Business Wire to typical Wall Street wires, to interpreted and edited stories on Securities and Exchange Commission filings. You can get retrieval software from half a dozen different vendors that flag the stories you want to read by keywords or content. The



news comes to you via either an FM subcarrier or an X.25 telephone hookup. The latter will be interactive later this year, giving you access to past stories and other Dow Jones databases.

We also got yelled at by a vendor of surge suppressors and power distribution gear. His gripe was that we hadn't covered those products for four years and that a lot had happened in the field. He's probably right, so we will revisit the product category soon. Reviews of

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FormTool

CIRCLE 380 ON READER SERVICE CARD

Bill Machrone

such products are seldom suspense-laden dramas with startling outcomes, but nobody wants to feel duped or feel they bought the wrong product. Also, even the most seemingly commoditized products are surprisingly different when you subject them to sufficient scrutiny. The last time we tore into these units, we found marked differences in surge-suppressing capabilities that had little to do with advertised capabilities or price. We'll see what the next crop brings.

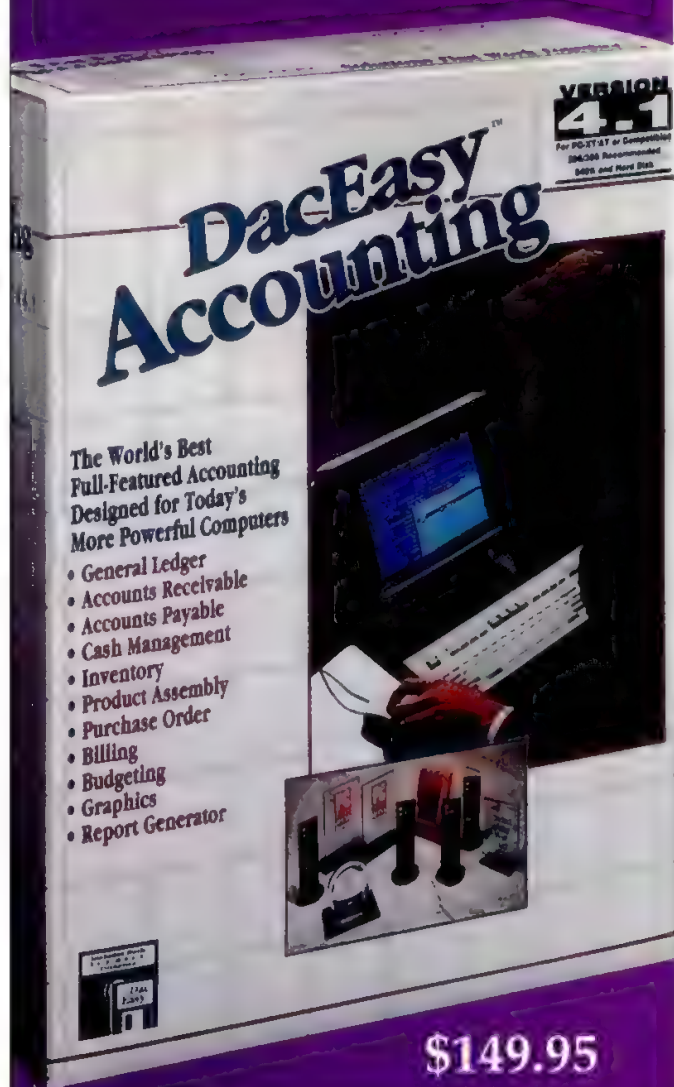
Midway through the day we broke for a panel discussion in which Dvorak, Zachmann, Derfler, Seymour, Ronni Sonnenberg (our publisher), and I presented our views on hot topics such as *Windows*, distribution, the home market, OS/2, Unix, and connectivity. After a hot Q and A exchange with the audience, everyone sat down for lunch, where the discussion of products continued.

PC-to-Mac connectivity is getting more important. We saw a whiz-bang file conversion program—from a company called Dataviz—that makes file transfer and format conversion a painless, highly transparent process. In addition to the expected word processing format conversions, the program also exchanges the popular PC graphical formats with Macintosh PICT files.

Then we saw Star Micronics' just-announced printers. Look at a picture of one and tell me if it doesn't look like a Lexus. TRW stopped by to talk about service. GVC showed us its 9,600-bit-per-second modems. After the formal appointments stopped, the demos didn't. We saw optical storage, graphics programs, multimedia cards, featherweight portables, development tools, and databases in a "mini" trade show.

You know how dogs like to ride in cars with their heads out the window? A dog's sense of smell is perhaps a million times more sensitive than a human's. Imagine, then, the psychedelic rush as they get a supercharged view of the olfactory world at 40 miles per hour. Well, Editor's Days are like that. Saturated and sated with products, we write up our impressions of what we've seen and enter it into a centralized research database. That way, every *PC Mag* staffer has access to anyone else's knowledge about a company or product.

And it's all in a day's work, Mom. ■



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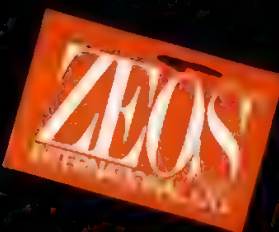
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John C. Dvorak



IBM's True Intentions

Imagine this scenario: you plan to buy a PC. So you pick up your phone, dial the 800 number, and at the other end of the line . . . it's IBM!

While pundits and analysts muse over the IBM PS/1, few of them are talking about the secret significance of the machine. People closely associated with IBM strategy point to the PS/1 as the final block in IBM's grand scheme to destroy the current retail channels. The analysis I'm about to outline is probably correct, as incredible as it may seem.

One goal is to destroy the computer store completely. BusinessLand, ComputerLand, and others are targets. Since few of these places have done much to endear themselves to the public at large, nobody will care if they all go broke. Actually, the stores are the secondary target. The primary target is Compaq. Apple Computer is also seen as an enemy. Both manufacturers depend on the computer retailer for their sales. Both are vulnerable if the store

system collapses. Both companies have eaten into IBM sales, and Compaq, in particular, has been munching big-time on IBM's lunch.

I'm told that IBM's big push will come through a direct and continuous sales promotion not unlike that done by CompuAdd or Dell. IBM already has an 800-number ordering system in place, and it long ago sent its field forces into corporations to move the PS/2 line. This direct marketing concept is the key to understanding the PS/1. IBM research indicates that to properly roll out a major direct sales offensive it has to have a full lineup of machines. This includes an easy-to-use plug-and-run low-end machine priced under \$1,000 that requires no hand-holding. Thus IBM developed the PS/1 with preinstalled software and an idiot-proof interface.

IBM'S PRICE WAR

The prices we now see may be bogus, especially if IBM starts selling directly to end users. According to one informed source, IBM has built more leeway into its prices than many of us would like to believe. He expects the loaded \$2,000 PS/1 to quickly drop to something like \$1,299 and the no-frills \$999 model to be sold for \$499 or less! IBM will finally do

what's expected of it—low-ball the industry and crush Compaq, the thorn in its side.

IBM will also try a new disruptive channel by placing the PS/1 machines into mainstream mall stores such as Sears, further pressuring traditional computer retailers. The possibility exists that IBM will low-ball the PS/1 out of these new outfits first as an "unauthorized" market test before finalizing its plans.

Strategists at Compaq and elsewhere are not unaware of this plot. Compaq is making moves toward direct selling, so expect it to develop a program on short notice, if necessary. Even without encouragement from IBM, Compaq cannot ignore the numbers being posted, even by relative newcomers such as Northgate, Zeos, and Gateway 2000, all through direct sales. It's no coincidence that Tandon Computers is going into direct marketing in a big way, having hired ex-IBMer Graham Beechum from Northgate. Beechum is known to be a savvy student of IBM politics and strategies. Apple seems to be the only company not willing to take this approach. If retailers fail, Apple may end up buying them out, turning, say, ComputerLand, into AppleLand.

No matter. This direct sales phenomenon



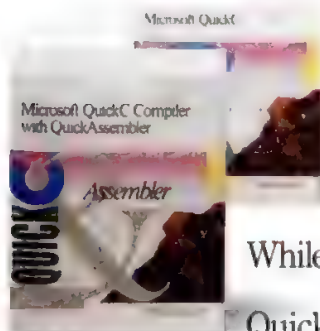
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will continue and appears to be a new aspect in the history of marketing. A peculiar combination of special-interest magazines (*PC Magazine*, the perfect example), Federal Express, UPS, telecommunications, 800-number direct sales, catalogs, decentralized manufacturing, and cost consciousness has made it inevitable. This trend is further promoted by the failure of computer stores to offer either service or selection. Welcome to the 1990s.

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Rumors about another player in the race to clone the 386 chip Dept.: Chips and Technologies has a secret project under-

way in hopes of becoming the first player to produce a workable clone 386 microprocessor. The company, looking to **make a killing**, has been designing around Intel chips for so long that it should be able to make the processor itself. At least it hopes so, since its line of support chips for **Micro Channel** have not been a good investment since MCA didn't become the hot ticket C&T expected.

The problem with 80386 clones, I'm told, is that all the 386 cloners are having a good deal of **trouble** with the protected-mode operation. While these guys can reverse-engineer a design when they can see signals coming out of the pins, they have **no idea** what's going on inside the chip. All the protected-mode machinations are internal.

It seems to me that some **smart cookies** should simply hire away every last Intel engineer they can get their hands on and work with these guys. Could be a good start-up.

Meanwhile, **Intel is so swamped** that its allocations for all the high-end chips are **sold out** for the rest of the year and into 1991. Right now **one bottleneck** in production is the worldwide capacity to apply the necessary epitaxial layer onto the silicon slices. Using something called an "epi-reactor," silicon is plated onto silicon wafers. There are only a limited number of these reactors, each of which costs nearly a **million dollars**, and they are running at 100 percent capacity as I write this. Much of this current production is being used up by the Japanese CMOS manufacturers.

Silicon itself may be in short supply. People don't realize that a move into the next generation of machines requires **gobs** of memory, therefore, more silicon. This keeps prices high for all advanced semiconductors by transferring worldwide resources. Worse, only a few companies grow silicon crystals and make wafers anymore. **The top** company is Shin-Etsu. Few Americans know that over the past decade the **Japanese** have managed to **grab** nearly 70 percent of the world's manufacturing capacity for silicon wafers. **The Germans** have the rest of the market with a few very small American

Inside Track

game played by buyers. This turned around in 1984 when the chip shortage was critical and the business went into a **slump** afterward. The perception is that this is happening again.

IBM Strange Bedfellows Dept.: Apparently IBM is working again with Matsushita, the huge Japanese conglomerate known in this country as Panasonic. It once made a PC for IBM that was later sold in Australia. It's now said to be making the Model 25 for IBM. Anyway, Matsushita is trying to **set up shop in Taiwan** to go into **full production** of some new IBM product or perhaps the PS/1.

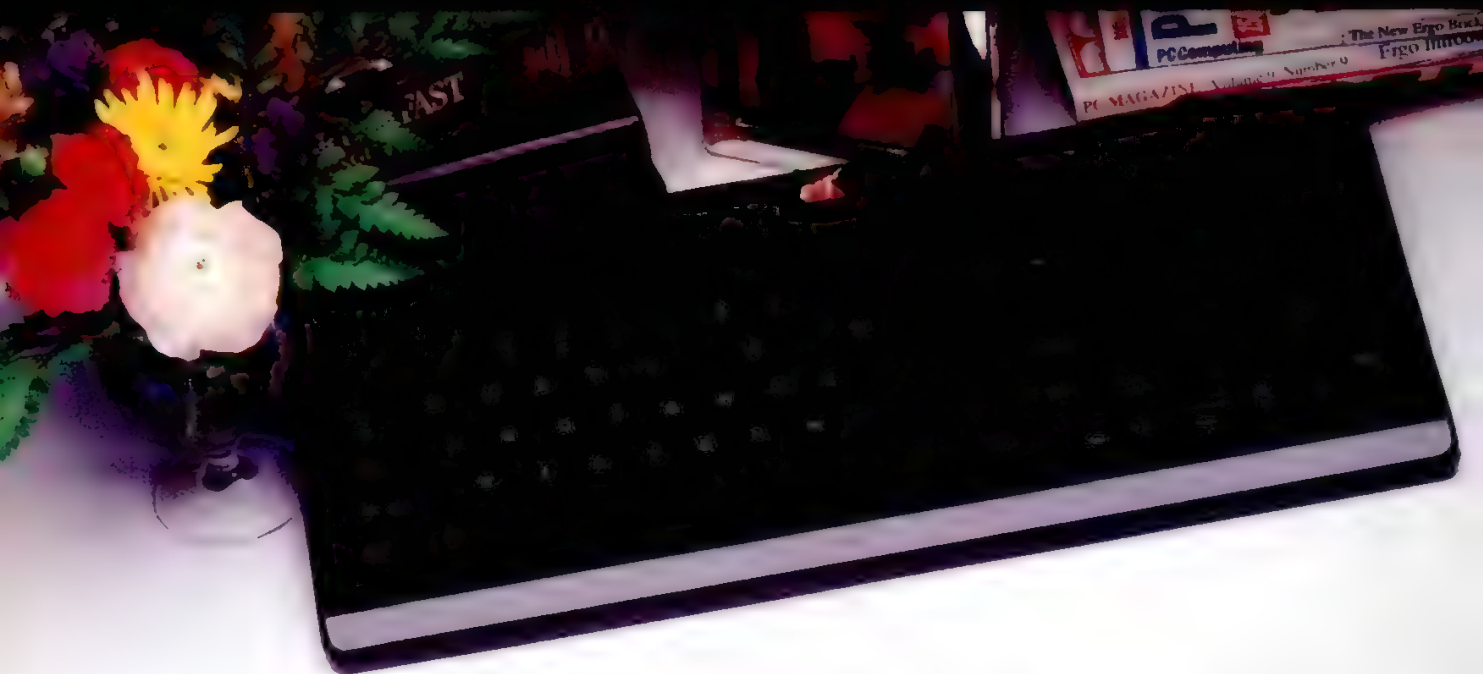
Borland Dept.: Several market research firms report that until the Lotus lawsuit, Borland's *Quattro Pro* was **outselling Microsoft Excel**. According to some sources it was outselling *Lotus 1-2-3*. This may be a bonanza for Borland. Let's say sales drop off because of the suit and consequent **bad publicity**. If Borland wins the suit then it can countersue over lost sales and lost customers. These kinds of countersuits usually result in **huge back-breaking settlements**.

The Roller Coaster Ride Dept.: If you're interested in wild growth figures for this industry, then the Dataquest Research numbers should make your hair stand on end. A few tidbits to consider: The market for notebook computers is

expected to **grow at a compound annual rate of 76 percent** for the next five years. This will fuel the so-called personal computer market which will hit \$62.7 billion by 1994. On top of that, the so-called business computers and technical computer segment of the market will hit **\$107.8 billion** in 1994. Think about this for a minute: you can have less than 1 percent of the market share and be a **billion-dollar company!** Software, on the other hand, is expected to be an \$8.7-billion market in 1994, compared with \$4.4 billion in 1989. Still nothing to sneeze at.

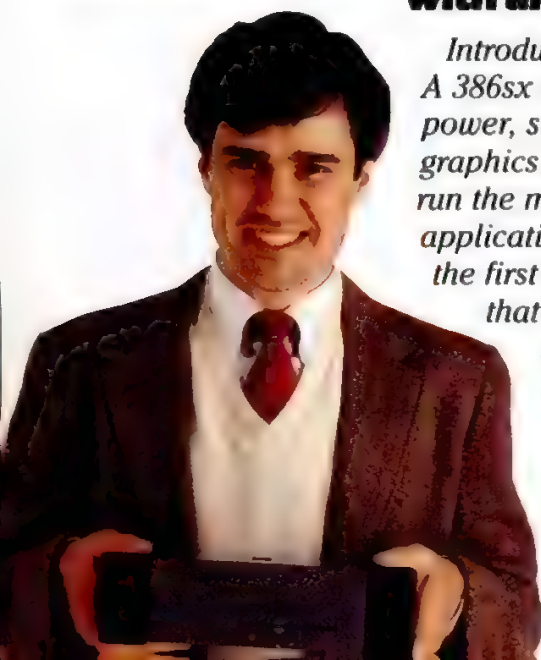
Database of the Week Dept.: With little fanfare, a company called Information Access (a division of Ziff-Davis Publishing Co.) has put on-line a service called **Magazine Database Plus**. It's on CompuServe—GO MDP at the "!" prompt. Already, Information Access has put computer specialty publications on-line for **easy** research. This new database has full text from **amazing sources**. Everything from

Intel is so
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allocations for all
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the rest of the year
and into 1991.



Cure For The Common Clone

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832k for DOS

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The Brick
3" x 8" x 11"
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high memory, and still leave the lower 640k free. The regular Brick shown above also accepts an internal ISA 16-bit half length card, while the "Stretch Brick," shown at right, accepts one full and one half length card.

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The "Home-PC Market" Myth Rises Again

The return of the crippled home PC and the surrounding hysteria over IBM and Tandy's latest efforts will only hurt the people these clunkers are meant to serve.

They're b-a-a-c-k. The home-PC zombies, that is... and they're trying to swipe your wallet once again.

I tried hard not to write about the PS/1. Honest. Though I've opined elsewhere that the PS/1 is a misfire, I thought *PC Magazine* readers—smart and well-informed enough to know that for the price of a PS/1 you could get a real computer—would ignore the machine.

But three things have happened since the PS/1 roll out that have persuaded me to pick up the cudgel on this matter. First, I've had an avalanche of "Whatcha think about the new PS/1" queries—in reader mail, in Q&A after

speeches, in conversations with readers around the country.

Second, Tandy followed with its own "home PC," an obnoxious little stinker that makes the PS/1 look good.

And finally, people are talking once again about the home-PC market with the same

seriousness, and with the same confusion, that we heard during the last "home-PC" boom/bust cycle with the PCjr in 1983 and 1984.

MISSING THE TARGET

The IBM and Tandy efforts show an acute misunderstanding of the market. They're like two drunks throwing darts: one didn't hit the target; the other didn't even hit the wall.

The essential nature of the home-PC market is this: home PCs are mainly used by Mom and Dad to stretch their workdays. They bail out of the office at five or six, head home, talk with the family over dinner, play with the kids for a while, then put in a couple of hours on the PC in the den—*continuing exactly the work they were doing at the office*—after they put the kids down for the night.

Better that, they figure, than another night of leaving the office at nine, getting home at ten, microwaving a plastic-wrapped plate of dinner from the fridge, peeking in at the kids as they sleep, then collapsing into bed.

I agree—I guess. One of my favorite lines

is that there's no such thing as "home work," only "home overwork." But I, too, work late sometimes, and better at hearth and home than down at Hearth Tower.

But to be useful as a workday-stretcher, a PC has to approximate the computer power Mom or Dad is used to in the office. Anyone who's had to drop back to an older, slower PC will remember how infuriating that was. That's just the reaction Mom and Dad will have as they sit down at an old, slow 286 design: the PS/1. The sludgy, 8086-based Tandy 1000 RL is even worse, of course.

Again, the **ONLY** real market for PCs in the home—if "market" means a function for which people are willing to spend \$1,500 to \$2,000—is for workday-stretching PCs.

Either IBM and Tandy disagree with that view—they think there really is a market for \$1,500 to \$2,000 home PCs for recalculating recipes—or they think they can fool us.

If the former, they're dead wrong. And if the latter, they aimed way too low: by matching the power of the *worst* PCs in general business use, IBM and Tandy have assumed that when Mom and Dad go shopping, they're going to be saying to themselves "Okay, how bad a PC am



ILLUSTRATION: JEAN-FRANÇOIS ALLAUX

I willing to put up with?"

That's not a question that leads people to spend two thousand bucks.

What about all those other joys of owning a home PC? All those things that motivate that bright, squeaky-clean nuclear family of IBM's circa-1958 fantasies to stroll into Dayton-Hudson and look admiringly at PS/1s?

The second and third realities of the home-PC market are that real PCs do those things,

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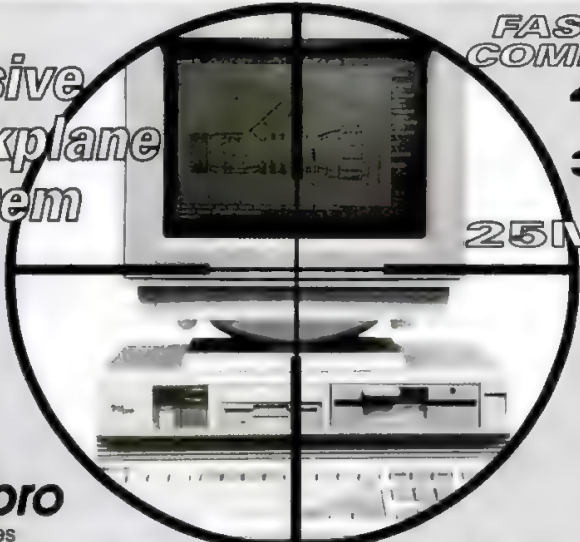
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too—and for a lot of those things, PCs don't work very well, anyway.

If you really want to keep your recipes in a computer, store your Christmas card list electronically, and try to balance the family's books on a personal computer, you can do those just as well, and faster, on a PC with enough power to also perform that take-home work satisfactorily.

And if what you really want is a game machine for the kids, you've got to be kidding to consider a PC: they're miserable game machines. As my wife points out, we already have perfectly satisfactory game computers in wide use: they have names like Nintendo and Sega on them.

Note some of the implications which arise from these realities.

Ease of use, for example: if the key users of the machine will be people who already use a PC at work, ease of use turns out not to be so important after all.

So by emphasizing ease of use, IBM and Tandy seem to assume the buyers of these machines are pretty stupid. *But stupid people don't spend two thousand dollars on PCs!*

And if the primary use of these machines will be for take-home work, then their home-management features are distinctly secondary issues. Yet both companies stress just those features.

Tandy is especially offensive, with an emphasis in its built-in programs on writing shopping lists (but with no way to take them with you to the store, unless you spring for another \$250 for a printer), doing packing lists for trips, managing your pantry, etc. Given these imbecilic programs, I'm surprised they didn't include something really obnoxious, like MommyCalc—"A Spreadsheet So Simple Even a Woman Can Learn to Use It."

I expected better. IBM could have updated the PS/2 Model 25—a nicely compact but feeble machine—and Tandy could have given us yet another of its Model 1000s, but one aimed at real needs.

Instead, the PS/1 seems to have kicked off another round of home-PC-market fantasies. PC vendors will take a bath, and you and I—or at least, hundreds of thousands of our friends—will wind up with yet another computer stuck up on a high shelf in the hall closet, next to the VIC20 and the Atari 400.

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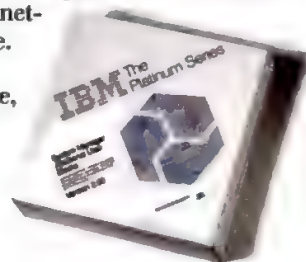
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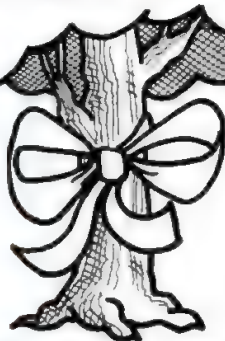
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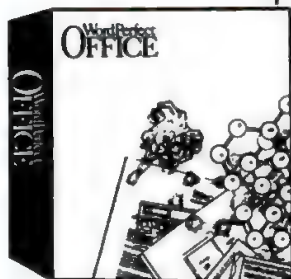
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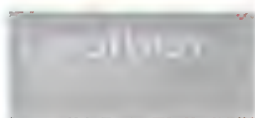
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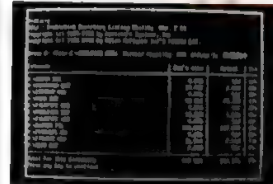
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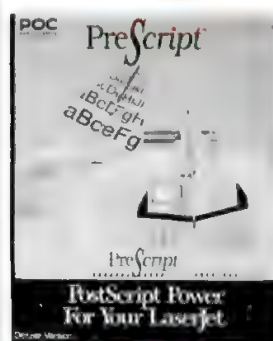
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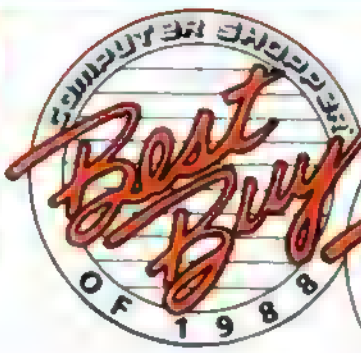
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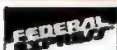
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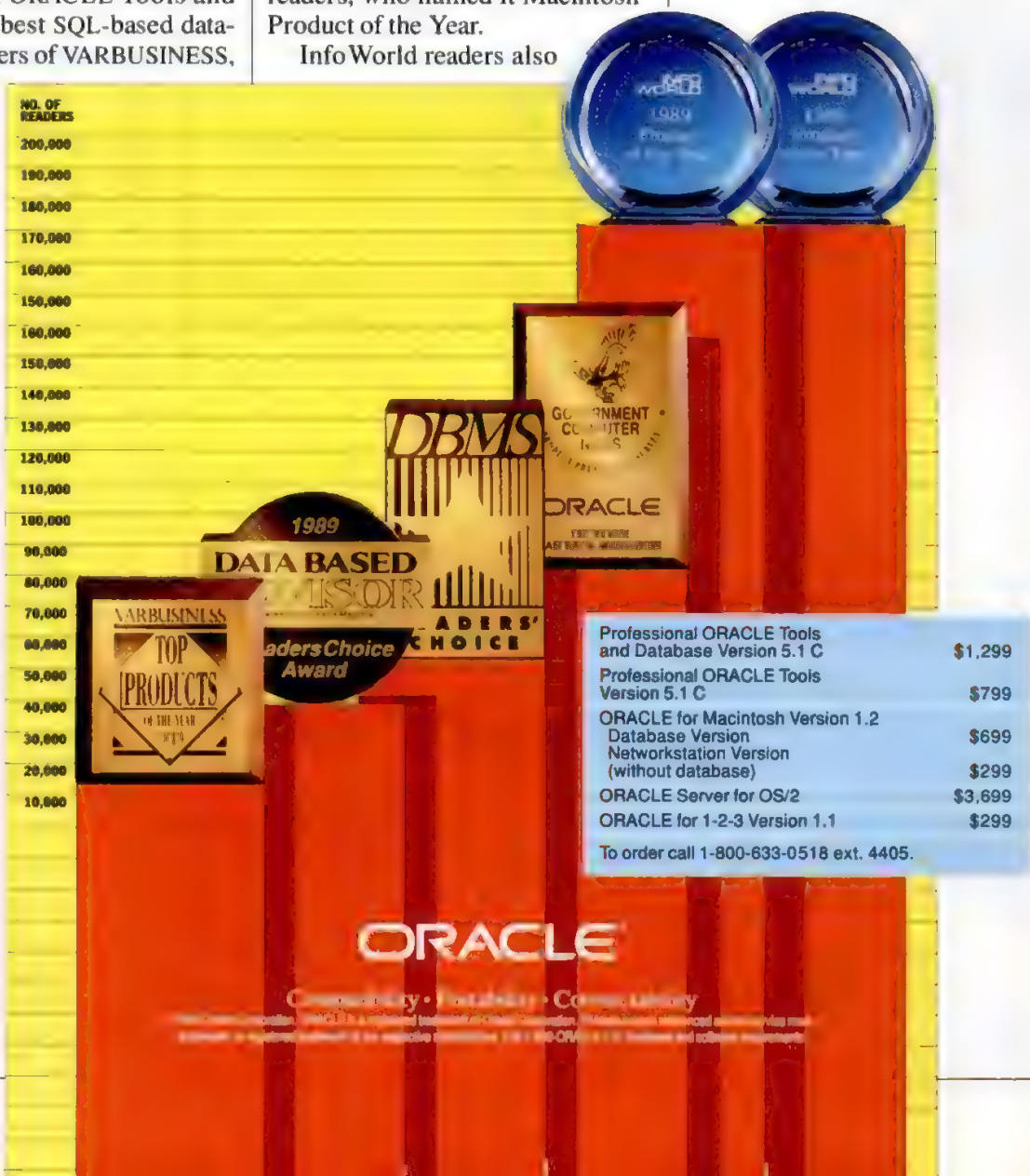
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William F. Zachmann



Early in 1985, when I first wrote a research memorandum titled "Downsizing," my contention that micros would increasingly replace minicomputers and even mainframes for enterprise computing was highly controversial.

Everybody *knew* back in those days that micros were going to stimulate enormous new demand for traditional systems. My contrary contention was viewed as eccentric at best, and at worst, as a lunatic fringe idea.

A lot has changed since then. The traditional data processing publications that once belittled downsizing now routinely carry articles about users downsizing enterprise-wide applications.

Those who once caricatured downsizing by reducing it to the absurd notion that

everything would run on personal computers are beginning to understand that PCs are not the only systems based on standard microprocessors. Network servers and larger systems like those from Stratus and Sequent are also part of the trend toward micro-based systems.

Like personal computers, more-capable network servers and larger microprocessor-based systems offer much lower costs-per-unit performance than do traditional mainframe and minicomputer systems. They also provide the speed, storage capacity, and features like fault-tolerance, and additional security necessary for large applications.

Where large databases, very high-speed computation, high-transaction volumes, or complex communications requirements are found, these multiple-microprocessor systems bring the low price-per-unit performance of PCs to such larger tasks.

The Compaq Systempro, NetFrame NF100, Mitac Series 500, and the NCR Tower series, as well as the larger Stratus and Sequent systems extend micro technology even to very large applications. They are just as much a part of the micro revolution of "downsizing."

Important as these more-powerful systems may be, however, it should not be forgotten that in many cases personal computers really *are* capable of replacing traditional mainframe and minicomputer systems. PCs alone, particularly when networked, often are sufficient

enough to do the job. Powerful Intel 386- and 486-based systems with more memory and disk storage are able to take on increasingly demanding application tasks.

To successfully apply personal computers to such tasks, however, requires a different set of skills and considerations than does simply employing PCs for individual productivity tasks. It requires the sort of "systems" thinking characteristic of traditional mainframe and minicomputer applications development.

That means going beyond the "shrink wrap" mentality regarding applications software. Putting personal computers to work replacing mainframes and minis for key applications isn't as simple as popping the shrink wrap off word processing software, inserting a floppy disk, and typing "A:INSTALL." Applications critical to the enterprise as a whole are seldom as generic as typical personal productivity applications. A certain amount of systems analysis and custom programming is required.

Further, since larger applications typically require sophisticated local area networks of personal computers, expertise both in networking hardware and network software such as



ILLUSTRATION: SHANNON JEFFRIES

Novell's *NetWare* or Microsoft's *LAN Manager* is also necessary.

Equally, the basic system-requirements analysis that is traditionally done for mainframe and minicomputer systems will also be necessary. While quite commonplace among skilled information systems professionals, analysis of this sort is not always familiar to those used to working only with personal computers.

Downsizing

Now that PCs are accepted as reasonable alternatives to mainframes and minis, a little cooperation is needed to get new applications written for downsized systems.

William F. Zachmann

HOW TO DOWNSIZE

Any application will have specific quantifiable requirements for processing, disk storage, number of transactions per unit of time, and so forth. These need to be precisely analyzed in advance in order to determine hardware requirements.

Let's assume, for example, that we want to create a personnel application to keep track of employees, their skills, training needs, and courses attended. Before we can determine whether the application can be handled on personal computer platforms, we need to determine what computer resources will be required.

Whether we are thinking of a database management system or a program in COBOL or C, we need to know first of

all how many employees we will need to track and how much storage is required for each employee's information. Multiplying the number of employees by the amount of storage required per employee record will tell us how much disk storage is needed for the application.

But before we know how much storage will be required for each employee, we must first decide what database system or file structure to use, dependent upon what goals the system will address. Other factors to analyze include how many updates will be necessary each week, day, hour, or possibly even minute, and how many types of inquiries and reports will be required from the stored information.

Complicated analysis of this sort is customary for information systems professionals, but it's not necessarily obvious to those who use personal computers primarily with individual productivity applications. For organizations to effectively seize opportunities to get better and lower cost information systems through downsizing, therefore, cooperation between skilled information systems professionals and users accustomed to "rolling their own" productivity applications will be extremely important.

There is no denying that knowledgeable end users are often much closer to the business problems than IS professionals, and are often much more able to see where the opportunities for new systems lie. However, it should be equally recognized that IS professionals have skills and expertise in developing applications that even the most sophisticated and computer literate end users may lack.

Successful downsizing will require both that end users become more familiar with the systems analysis requirements that IS professionals take for granted, and that IS professionals in the organization become more familiar with the micro technologies that provide much lower cost platforms for enterprise systems. Both "old dogs" will need to learn some important "new tricks" to take advantage of the opportunities that downsizing traditional systems provides.

Mainframe and minicomputer systems may be headed for obsolescence, but the skills used to develop these applications systems will continue to be necessary for developing the micro-based systems of the future. Neither end users nor IS professionals (nor, for that matter, the management of the organizations for which they all work) can afford to ignore that. ■

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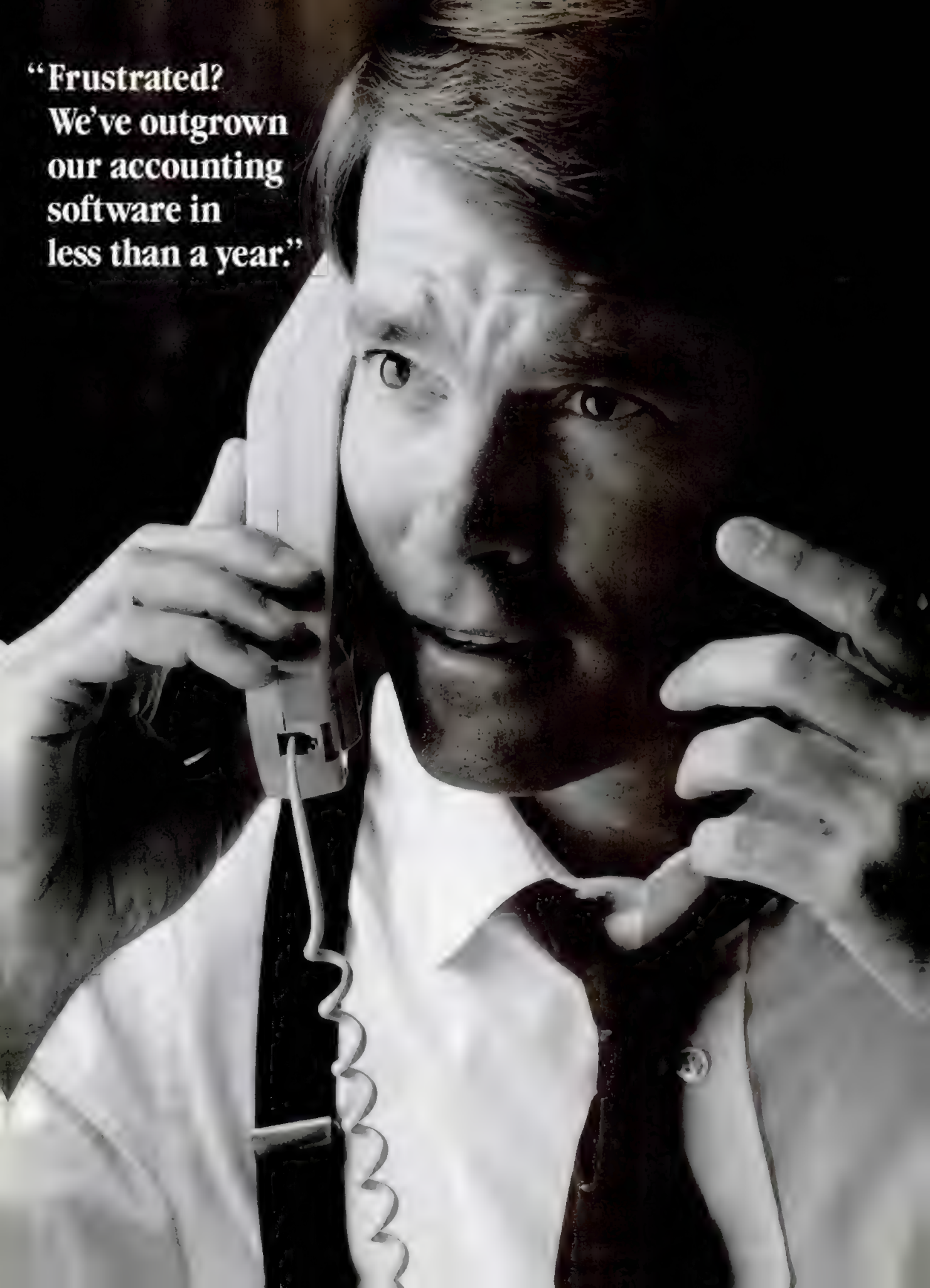
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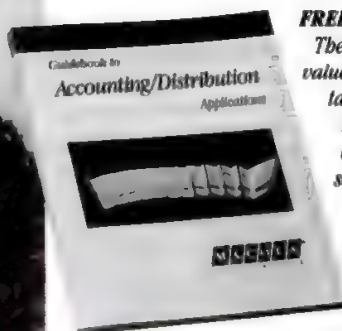
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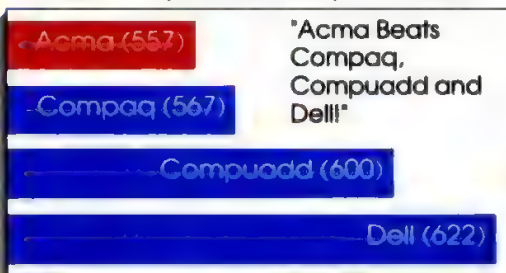
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No longer are your choices in the Micro Channel pool limited to IBM, IBM, and Tandy. A dozen vendors have now jumped into the water with 386- and 386SX-based MCA systems.

by Winn L. Rosch



CASHING IN ON THE MICRO CHANNEL

Points of view about IBM's Micro Channel architecture are as sharply split as on any religious issue. To some, IBM's current design architecture represents the biggest breakthrough in computing since beads were strung on the first abacus. Others see it as the most flagrant fraud since the Piltdown man, a mere con to keep clone makers out of the PC market.

Several facts are indisputable. The Micro Channel architecture (MCA) is real. It's an established standard that has already passed its third birthday. More than two million IBM Personal Systems incorporate the architecture, and as of this writing, at least 27 vendors have announced that they are producing MCA machines.

It is also incontestable that MCA is incompatible, physically and electrically, with expansion boards made for PCs and ATs. That incompatibility is intentional: if you can't use old boards, they can't hold back the performance

PHOTOGRAPHS: THOM O'CONNOR

of your Micro Channel computer. Some believe that this incompatibility mirrors IBM's motivations in developing MCA, reflecting an insidious desire to wrest back total domination of the personal computer market—but even they admit that MCA is superior to the classic AT bus (also called the ISA or Industry Standard Architecture bus). It's faster, cleaner, more powerful, and more versatile.

MCA is also undeniably harder—not to mention more expensive—to clone. To make an MCA computer, you need more than the aspirations, screwdriver, and third-grade education that evidently sufficed for building a PC clone. The technology is complex enough that perfect compatibility is elusive.

Still, while two of the ten non-IBM PCs we reviewed failed to pass at least one of our compatibility tests, the machines in this roundup confirm the final fact: MCA *is* clonable. IBM fully documents the architecture's operation with a complete description of its timing characteristics, which govern when and how MCA devices react to one another's commands. (IBM never provided this timing information for the classic AT bus.) In addition, VLSI chips have become available for building both MCA computers and expansion boards.

These facts lead to an inescapable conclusion: If you care about performance, you need to know about Micro Channel architecture. PC Labs has found that ISA-bus machines are cost-effective, high-performance products that work well with today's DOS or on small LANs, yet MCA (or the non-IBM alternative, EISA) remains an intriguing choice for duty on high-end networks, as well as for future applications, because of its many advanced features.

PHILOSOPHICALLY SPEAKING

The Micro Channel bus, the connectors into which you plug expansion boards, and the circuitry that links them together are only the embodiment of the MCA specification—the blueprint or building code that outlines all the rules for building this type of computer.

The distinction between the MCA specification and its physical embodiment is an important one. Real computers are implementations of the MCA design, defined by it rather than defining it. The MCA specification is not static; it's designed to be changeable while maintaining compatibility. It is itself more flexible

than any single computer could possibly be, allowing a wide variety of computers to be built around its architectural core. MCA computers do not have to incorporate all the features of the MCA specification to be compatible; for example, 8-, 16-, and 32-bit bus designs are possible.

Because MCA is a specification, fully defining it means understanding and absorbing reams of diagrams, scads of schematics, and a dossier of descriptions. But all of the information can be distilled to a few essential concepts that characterize

the four fundamental areas in which this architecture improves on the AT bus: performance, concurrency, reliability, and accessibility.

MCA earns a performance edge in several ways. First and foremost, it's designed to operate faster. The biggest speed limit on classic-bus computers is their tendency to emit electromagnetic interference. The MCA design minimizes this interference, so that its bus can potentially operate faster than the AT bus. Current MCA implementations are 25 percent faster than classic-bus machines on like chores simply because most MCA

BUS MASTERS TAKE CHARGE

by Winn L. Rosch

The conventional ISA computer is essentially nothing more than a microprocessor enhanced with incidentals like memory and an expansion bus—a pocket calculator with its wildest dreams fulfilled. In ISA computers, the microprocessor is the all-knowing brain that controls everything and also sets the limits. The rest of the computer can do nothing more or faster than the microprocessor, whose overhead constrains transfer speeds across the expansion bus.

Micro Channel architecture, however, borrows a concept from main-frame computers: The scheme turns the microprocessor and the expansion bus into separate subsystems, each freed from the limitations of the other. Instead of having a single element in control, the MCA expansion bus can be commanded by any of several devices called *bus masters*. The bus master in charge has an elegantly simple function; it just moves information across the expansion bus. MCA gives it free rein to do whatever it wants. The interactions among bus masters are coordinated by special system-board circuitry known as the central arbitration point (or CAP).

A bus master owns the MCA system as long as the CAP gives it command. Typically, the bus master will be a device such as a high-speed direct memory access (DMA) controller, which moves bytes from one place to another with extreme dispatch.

Independent bus masters accelerate

the performance of MCA computers in several ways. For one thing, they are not restricted by microprocessor performance. The MCA specification defines data transfer rates up to 160MB per second, which is nearly three times as fast as the peak transfer rate of a 33-MHz 80386 microprocessor with true zero-wait-state memory and no system overhead (that is, without certain functions that are hardly incidental, such as memory refreshing).

In addition, because bus-master transfers take place without microprocessor intervention, an MCA computer equipped with cache memory can continue working during a bus-master data transfer, achieving a small degree of parallel processing. Bus masters that have their own microprocessors and memory (as on a coprocessor board or an array processor) yield an even greater degree of parallel processing, stealing only a little expansion bus time when they need to interact with other parts of the system.

THE SLAVE ROLE

The opposite of a bus master is the *bus slave*. As its name would imply, the slave responds to the commands of the bus master, accepting the data the bus master sends out or originating the data the bus master requests. The bus slave functions like an ordinary expansion device (such as a video card or drive controller) in a nonmastering computer such as an IBM PC or AT.

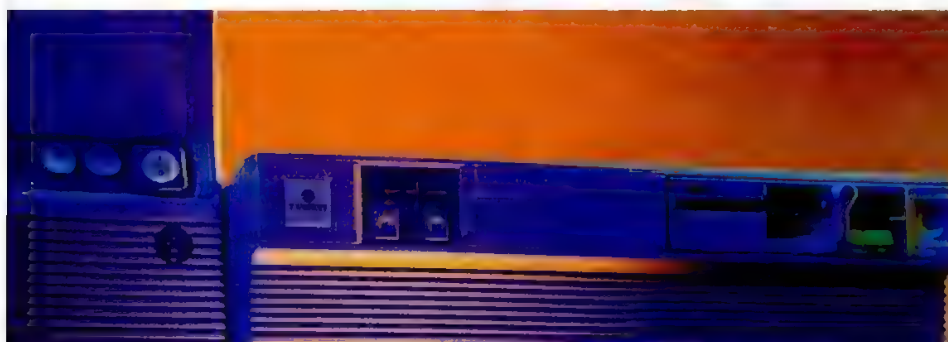
The difference between bus master and bus slave is entirely functional. In the MCA scheme, one bus master can



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computers have a 10-MHz bus clock and most AT-bus (and EISA) machines have 8-MHz bus clocks. Beyond that advantage, features that are already defined but not implemented in today's PS/2s allow for speed increases of up to 800 percent in future computers.

DOUBLE DATA

MCA gains performance over the AT bus with its full 32-bit bus width, doubling its data-handling capacity. The original MCA specification included several new bus protocols, including burst mode and matched-memory cycles, to improve data

transfer speed. When the MCA specification was revised with the introduction of IBM's RISC System/6000, more fast-transfer modes were added, including streaming data mode and multiplex data transfers. Future MCA computers and peripherals that take advantage of all the provisions of the revised MCA specifications can potentially transfer data across their expansion buses at 160 megabytes per second. That compares to 16 MBps on the AT bus, 20 MBps on the original MCA, and 33 MBps under the EISA speci-

fication as it stands at the time of this writing.

MCA is designed for concurrency, which means that it is capable of supporting both multitasking and parallel processing. It combines bus masters and a hardware-controlled arbitration system to break the direct link between a computer's microprocessor and the expansion bus (see the sidebar "Bus Masters Take Charge").

In AT-style computers, the expansion bus is merely an extension of the system's microprocessor, and the microprocessor is burdened with handling every transaction that travels across the bus. The MCA design broadens the bus bandwidth beyond the data-handling abilities of any single microprocessor and allows several intelligent subsystems to share the bus effectively.

Today, bus mastering doesn't make much difference. After all, DOS is a single-tasking operating system, and the performance of the AT bus exceeds most single expansion boards. For example, the 10-MHz data speed of an ESDI hard disk controller or Ethernet adapter is not constrained by AT bus performance. But MCA comes into its own when multiple intelligent adapters have to operate simultaneously.

Right now, only multiuser systems—networks and workgroup computers—need that kind of power. In the future, new operating systems offer the hope that even single-user systems will benefit from bus-mastering designs like MCA and EISA. Imagine, for instance, an advanced version of OS/2 in which each thread of a task could automatically be directed to a separate MCA bus master.

CRASH DUMMIES

The Micro Channel architecture is designed to be especially reliable. Thanks to such advanced technologies as surface-mount components and application-specific VLSI (very large-scale integration) circuits, IBM Personal Systems are designed to operate considerably longer without failures than PCs and ATs. For many businesses, that translates to correspondingly cheaper maintenance and service contracts. For individuals, that should mean fewer costly, frustrating trips to the repair shop.

Earlier this year, MCA's theoretical reliability seemed at odds with reality: Some MCA hardware was reportedly failure-prone. But for the most part, these

BUS MASTERS TAKE CHARGE

CONTINUED

take control over another, making the second its slave. When a new situation demands, the same two devices can switch roles.

All expansion boards can function as bus slaves; consequently, there is no such thing as a special bus-slave board. Boards that can function as bus masters are special, however, and require additional circuitry to take command of the system. Such expansion boards should be called bus-mastering adapters or bus-mastering boards.

MCA is designed to support up to 15 bus masters (not counting the computer's microprocessor), limited by the coding abilities of the four hardware signals that the CAP uses for arbitration. To take control of the MCA expansion bus, a bus master sends out special hardware commands to the CAP and the CAP resolves any conflicts between competing masters. By default, each bus master is assigned an arbitration priority, although the MCA specification allows these priorities to be programmed.

Bus masters are not just for multi-microprocessor parallel computers. Any input/output device can take advantage of this technology to enhance performance, power, and overall throughput. For example, an intelligent bus-mastering hard disk controller could store disk data in internal cache memory and encrypt it off-line (from the bus and host microprocessor), on its way to or from the disk drive, providing absolute file security with minimum system overhead. The

**Unrestricted by
microprocessor
performance, bus masters
increase the speed at
which information is
transferred in MCA
systems.**

same technology could add advanced error correction to disk or tape mass-storage systems.

A bus-mastering network adapter can free your system's microprocessor from the layers of protocol management because the adapter can communicate directly with other expansion boards in the server. Bus-mastering communication concentrators could likewise relieve the load on the microprocessor, supporting many types of terminals by means of in-line protocol conversion or emulation. Bus-mastering microprocessor upgrades can replace the host microprocessor on the system board or operate parallel with it to improve the system's data processing capabilities. Bus-mastering display systems can extract data directly from memory and assume all the responsibility for creating a complex image. Bus-mastering technology also lends itself to developing intelligent internal subsystems for the processing of complex mathematics, speech, or electronic vision. ■

problems were related to manufacturing difficulties on the part of IBM and MCA clone vendors and to the software shortcomings of third-party peripheral vendors, rather than to actual defects in the MCA specification. In particular, the adapter description files that some peripheral manufacturers provided did not precisely follow IBM's specifications; as a result, some expansion boards failed to operate properly. Most of these problems were resolved by the time PC Labs conducted the testing for this review.

Of course, reliability means more than just having your computer work when you turn it on. You also have the right to expect that your computer won't add errors to your data or just randomly crash. MCA incorporates several error-detection systems to prevent such occurrences. Parity checking across the MCA expansion bus ensures that every data transfer is accurate. Asynchronous and synchronous error-detection systems not only stop noise-induced errors (which are admittedly rare) from rippling through your data but also help locate the exact part of your system and program in which each error occurs. In addition, MCA's watchdog timer helps prevent a crash in one task on a multitasking system from dragging down your entire computer.

The MCA design also improves the accessibility of personal computers to new users. System setup and expansion board installation are simplified through a consistent menu-driven software interface that automatically coordinates the conflicting demands of multiple expansion boards without making you adjust switches or jumpers. Expansion boards are easier to plug in, requiring no tools. They even have plastic grips to make them easy to pull out.

Unfortunately, not all manufacturers follow IBM's lead in making MCA computers more accessible. Some MCA computers and accessories still cling to their beloved DIP switches. Many still require you to twist out screws to get at their expansion boards (which you can then remove without tools!).

PLUG-IN PROBLEMS

When manufacturers take such liberties with the underlying concepts of MCA, the question of compatibility arises. All MCA computers are theoretically compatible. The reality may be different. Although IBM requires that all manufacturers of MCA computers be licensed to use IBM

technology (the requirement actually stretches to all personal computer manufacturers), an IBM license is no guarantee of compatibility. It's merely an authorization; like a driver's license, it is neither a certification of ability nor a promise of assistance. An IBM license only gives a manufacturer permission to attempt making an MCA computer. The only direct aid that IBM gives developers is its uneven technical reference manuals and sometimes a seminar (although the company reportedly has been assisting the makers of MCA expansion boards in creating compatible products).

Consequently, you have no real guarantee that a supposedly compatible MCA

computer meets all of IBM's specifications. When PC Labs first began to test the compatibility of MCA computers nearly a year ago, the machines' incompatibilities and inconsistencies were not very subtle. In the last six months, however, the makers of MCA computers have addressed most of the problems the Labs turned up. With few exceptions, the incompatibilities have been corrected.

PC Labs examined not only whether a board could be installed in the manner envisioned under the MCA specification, but also whether each board would function properly once it was installed. We used only expansion products from top-name vendors that included well-written ADF files. A diversity of peripherals, from fax boards to network cards to tape backup



EDITOR'S CHOICE

- ALR MicroFlex 3300
- NCR PC386sx/MC₂₀

If you're determined to have an MCA computer on your desk or use one as a file server, the ten challengers represented here give IBM a run for its money. In some cases these systems exceed the abilities of the originator of Micro Channel architecture. Most have also solved their compatibility problems; with the exception of Tandy and Wang, all passed our suite of compatibility tests.

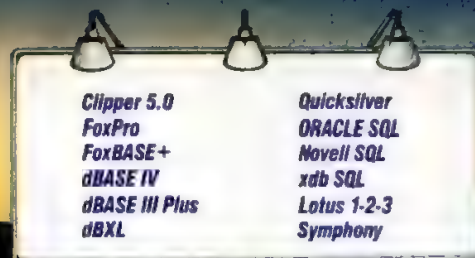
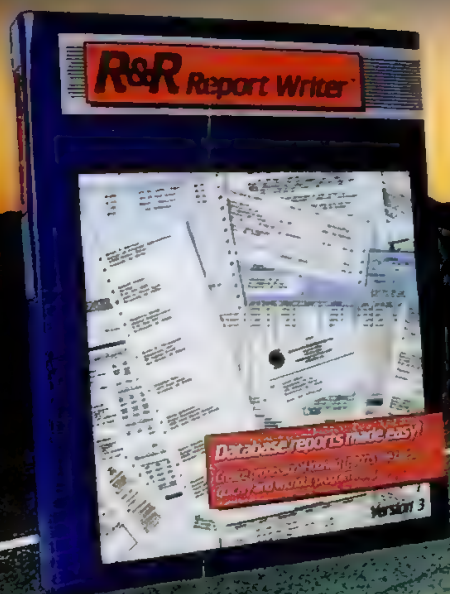
Two computers deserve Editor's Choice. The 33-MHz ALR MicroFlex 3300 is the fastest and most versatile, offering the most bang for the buck in the 386 category. And the NCR PC386sx/MC₂₀ represents a good value in a 386SX machine, from a company with a tradition of providing admirable service and support.

The ALR MicroFlex 3300 blew away the 25-MHz MCA models in speed, and it ties for third place on our 80386 Instruction Mix test when compared with similarly equipped ISA machines (see "Speed to Burn: 22 of the Fastest 386s," *PC Magazine*, February 13, 1990). The computer also offers remarkable power, with such features as a 642MB hard disk and the ability to hold up to 64MB of RAM. At a list

price of \$7,909 for *PC Magazine's* standard configuration (including 4MB RAM and a 120MB hard disk), the MicroFlex 3300 will set you back about \$1,000 more than a typical ISA machine, but you'll be getting the assurance of a top-quality system and a company that has made a commitment to MCA.

NCR's PC386sx/MC₂₀ is a better choice than IBM's PS/2 Model 65SX. It offers competitive pricing; the standard configuration costs \$4,844, which is \$2,000 less than the similarly configured IBM. While the NCR falls a bit short, providing only a 44MB hard disk for that price, the machine still makes an excellent workstation for *Microsoft Windows*. And thanks to NCR's one-year on-site service policy, you'll get the kind of support you need as well.

IBM's PS/2 Model 70-A21 deserves honorable mention; it comes from the company that set the MCA standard, and with it, you should never have to worry about compatibility issues. It's a good performer (though by no means the fastest on our list), and is widely distributed—often at deep discounts—and widely supported. Its case construction also deserves recognition, but the small-footprint design limits the machine's usefulness as a file server.



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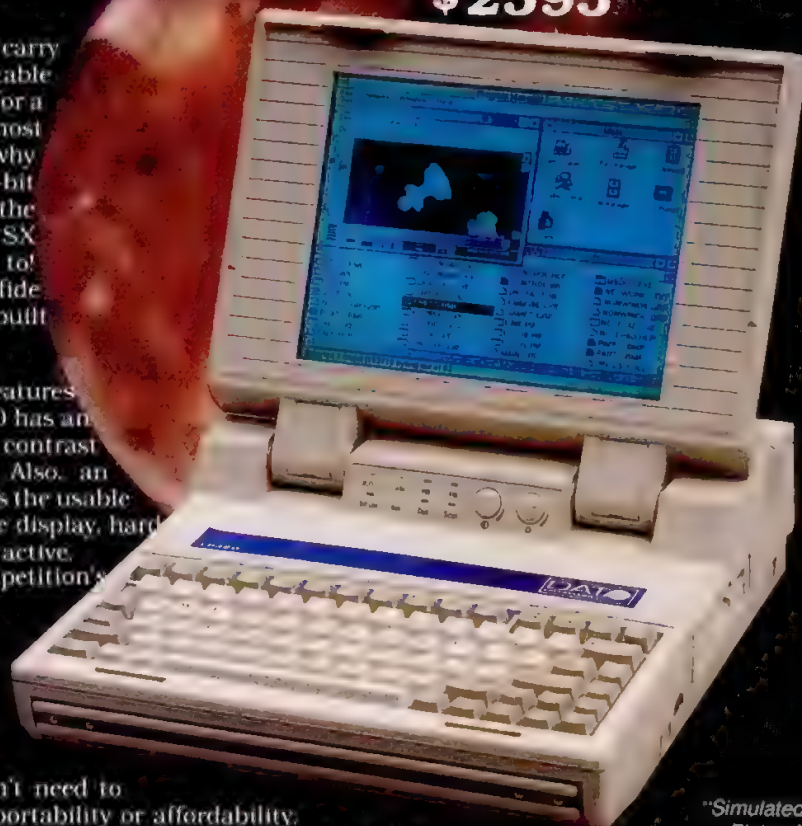
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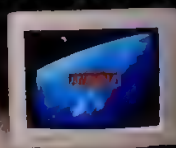
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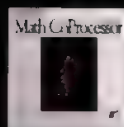
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units, were installed and tested to see whether these MCA machines were truly compatible at last.

The two failures in our tests show that plug-and-play operation of MCA computers and expansion boards is getting better, although it's still not perfect. You may still need to do some head scratching—as you would with classic AT-bus computers.

SLOW GAIN, MUCH PAIN

Within three years of its introduction, the classic PC AT bus was the most popular expansion design among personal computers. MCA has not found such wide-ranging support. Beyond the greater difficulty in crafting compatible machines, there are other reasons, too.

One factor has been users' reluctance to abandon the classic AT bus. Not only are they comfortable with that bus, they often have a substantial investment in old expansion boards that won't work with MCA. In contrast to the United States, where the AT standard is entrenched, MCA computers are selling extremely well in the European market. The Continent was slow to embrace the classic AT bus, and few there are attached to it.

Cost is another reason why MCA has been slow to catch on in the U.S. Cloning an MCA computer takes a toll, in the form of the licensing fees IBM demands for the use of its technologies. Even renegade Compaq reportedly pays for IBM licenses. The terms of these agreements can only be speculative because IBM does not disclose the cost or nature of its licensing agreements. Costs reputedly range from nothing (as in cases of cross-licensing, where IBM and another manufacturer trade access to each other's technologies) to as much as 5 percent of the price of the finished computer. Many industry sources have reported that IBM has had to reduce the high cost of MCA licenses to increase the architecture's acceptance among manufacturers.

MCA technology still appears pricey indeed. When a manufacturer offers similar machines that use the same microprocessor but differ in bus design, the MCA version typically costs \$1,000 more than its classic-bus counterpart. EISA machines incur a similar price premium. Either way, that's a lot to pay for promises, considering that the benefits of these advanced bus technologies are elusive at best with today's software.

Perhaps the most important reason that

more people haven't bought MCA computers is the limited number of MCA machines manufactured. Larger corporations have been buying MCA computers as fast as IBM could make them. (Among other factors, they like the improved reliability of IBM's MCA computers, which is actually a result of the machines' advanced circuitry, not their expansion buses.) With the exception of the rarely publicized Tandy 5000 MC, however, MCA clones weren't available until just a few months ago.

**On-paper arguments
about superior
technology will not
guarantee a market
winner, particularly
when the benefits are
not apparent to the
average user.**

THE COMPETITORS

Finally that situation is changing, as the 12 machines in this review demonstrate. If you want Micro Channel architecture in your next PC, you now have a choice, even if you restrict yourself to the highest-performance machines based on the latest microprocessors, such as the Intel 386SX, 386, and 486.

This review is limited to computers based on 386SX and 386DX chips, because we wouldn't recommend a lesser microprocessor in an MCA PC—or any PC. The speed ratings of these machines range through the entire power spectrum. Those with the lowest clock speeds operate at 16 MHz: the Apricot Qi 300-80, IBM PS/2 Model 65SX, and Wang MC 350/16S. Three machines have 20-MHz clocks: the NCR PC386sx/MC₂₀, Reply 386SX/20, and Tandy 5000 MC. Five more run at 25 MHz: the Apricot Qi PCi, IBM PS/2 Model 70-A21, Memorex Telex 7270 Intelligent Workstation, Mitac MPS3000F, and Olivetti P800. The fastest clock, at 33 MHz, belongs to the ALR MicroFlex 3300.

These compatibles are not much

cheaper than IBM's own MCA computers (presumably, thanks to the licensing fee and the cost of development). Consequently, price is not the most compelling reason to choose a compatible rather than an IBM MCA machine. Instead, you'll want to look at features and performance. The best of the compatibles handily outperform IBM's offerings. And MCA compatibles offer you more growing room—more expansion slots and more drive bays. They also offer a greater range of standard hard disks and the availability of 5.25-inch internal floppy disk drives.

Certainly you have wider choices among classic-bus computers than among these MCA compatibles. And you'll find similar offerings in the EISA camp. Which bus to choose remains a tough question.

In theory, MCA has higher performance potentials than the classic AT bus and EISA, because it's not carrying the baggage of a dead bus. But anyone who remembers the standards war between Beta and VHS videocassette recorders knows that on-paper arguments about superior technology will not guarantee a winning place in the market, particularly when the benefits are not apparent to the average user. As mentioned earlier, PC Labs recently showed that neither EISA nor MCA will demonstrably improve a PC's performance on today's DOS applications. From a functional standpoint, any one of the three available expansion buses is acceptable right now. (See "The Bus Wars: ISA's Surprising Staying Power," *PC Magazine*, June 26, 1990, for a direct comparison of the three bus architectures.)

For the future, the call between EISA and MCA is difficult. Both buses offer similar abilities (after all, EISA's designers borrowed the best ideas from MCA). And the big promises of both remain unfulfilled.

If you want an advanced-bus PC, right now you'll find a wider choice among MCA than EISA machines. Counting all manufacturer-designated model variations, 81 MCA computers with 386SX or better microprocessors had been announced by the time this story was written. (Seven 286 machines were also available.) By contrast, 57 models had been announced with the EISA bus, all of which had 386SX microprocessors or better. Hundreds of other models based on the classic AT bus were available at the time.

Thus, your computer choice is no longer limited if you favor a particular expansion bus. If you believe that MCA will ulti-



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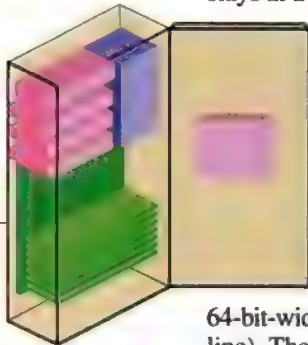
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mately triumph—or if you believe that someday you'll work with an operating system that can take advantage of bus mastering and other advanced features—the 12 Micro Channel PCs reviewed here offer you some excellent alternatives. Even with today's software, they will prove themselves capable performers. If you care about the performance of the computer you use, if you care about multitasking, and if you care about staying abreast of technology, you'll want to consider one of them.

ALR MicroFlex 3300

ADVANCED LOGIC
RESEARCH INC.
by Bruce Brown



Micro Channel architecture customers, take heed; potential MCA competitors beware. ALR says it intends to be the premier second source for MCA computers. The company has a range of high-powered computers for customers who want MCA but don't want to be tied exclusively—or even partially—to IBM. Its 33-MHz 386-based MCA machine, the ALR MicroFlex 3300, is faster, less expensive, and more expandable than IBM's 25-MHz 386 flagship PS/2 Model 70-A21.

In its standard configuration in a small-footprint desktop case, the MicroFlex 3300 costs \$7,909. The price includes 4MB

RAM with a 120MB hard disk with an ESDI controller; a 128K RAM cache; a 1.44MB floppy disk drive; a 16-bit VGA adapter and color monitor; parallel, serial, and mouse ports; and DOS 4.01. Our test machine, in a capacious tower case, included a 642MB 16-millisecond Maxtor hard disk, a 15-MHz ESDI controller with a 32K disk cache, and an 80387/33 coprocessor. Even with the fast numeric coprocessor and huge hard disk, the price stays at a very competitive \$14,006.

ALR uses its own motherboard with an Intel 386 chip set and Phoenix ROM BIOS. The MicroFlex 3300 has an Intel 82385 RAM cache controller; special implementation circuitry in the motherboard doubles the standard maximum 64K RAM cache to work with the machine's two 64-bit-wide data paths (unique to the ALR line). The result is that memory access is speeded up: you get much faster performance than with conventional memory architecture. The single standard memory card, outfitted with the proper 4-megabit chips, can hold up to a whopping 64MB of RAM. Like other ALR computers, the MicroFlex 3300 can use off-the-shelf SIMMs, and that means you can shop around for the best price—an option not available with systems from vendors like IBM and Compaq that require you to buy special memory chips or modules directly from them.

The MicroFlex 3300 will accept a Weitek math coprocessor in place of or even in addition to the 33-MHz 80387 chip. Because the relevant circuitry is asynchronous, you can add coprocessor chips ranging from 16 to 33 MHz.

A RUGGED PERFORMER

The MicroFlex 3300's tower case, set off by black vertical-ribbed front panels, measures 23 by 7.5 by 18.5 inches (HWD). It has room for one full-height and four half-height storage devices; three of the latter can be removable media. The standard 200-watt Astec power supply provides a generous five connectors.

The machine is built to rugged specifications. To access the inside of the case, you remove a panel on the left of the tower and then take off a single cross brace that extends from top to bottom. With the brace removed, you unscrew one side of a



FACT FILE

EDITOR'S CHOICE

ALR MicroFlex 3300

Advanced Logic Research Inc., 9401 Jeronimo, Irvine, CA 92718; (800) 444-4257, (714) 581-6770.

List Price: With 2MB RAM, 70MB hard disk, 1.44MB 3.5-inch floppy disk drive, one parallel and one serial port, mouse port, \$5,795; with 4MB RAM, 120MB hard disk, VGA monitor, DOS 4.01, \$7,909; with 642MB hard disk, 80387/33 coprocessor, tower case, \$14,006.

In Short: This ultrafast 33-MHz 386-based machine is available in either a small-footprint desktop or a towering vertical case (with enough slots and drive bays to excel as a file server). The MicroFlex 3300 makes the most of ALR's proprietary 64-bit-wide memory bus and a 128K RAM cache.

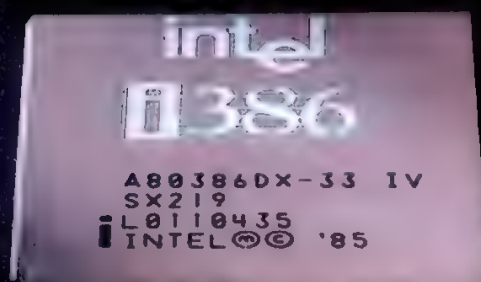
CIRCLE 602 ON READER SERVICE CARD

heavy horizontal arm. Swing the arm wide and you have free access to the drives and expansion cards.

With the slots for the memory card, hard disk controller, and 16-bit VGA adapter filled, four expansion slots remain open. Two of these MCA-compatible slots are 32-bit, and two are 16-bit. In all, there are four available 16-bit slots, and two of them have extensions for high-speed video cards—useful for those who may need to run two monitors off the same machine at once. PC Labs' benchmark tests show how well ALR's killer combination of RAM cache and processor speed works. The MicroFlex had the fastest score of the 14 PCs reviewed on the processor tests. Video and drive scores were also excellent, all in first or second place except its BIOS Disk Seek test score—a respectable sixth place in a very narrow range.

ALR's standard parts-and-labor warranty is for one year. Repairs can be performed on a carry-in basis either at your ALR dealer or at authorized ALR service depots, including Intel service centers nationwide. You can also buy on-site service contracts directly from the Intel service provider.

The ALR MicroFlex 3300 is a fine, rugged 33-MHz machine. Its tower configuration beats IBM's top performer, with better speed and room for more drives and expansion cards. The MicroFlex 3300 also compares favorably in price; the relatively low-cost desktop version is attractive, especially when you keep in mind that all ALR machines are sold through dealers, and therefore substantial discounts are negotiable. Look out, Blue!



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Government Computer News, "Arguably the fastest MS-DOS and OS/2 micro in the world."

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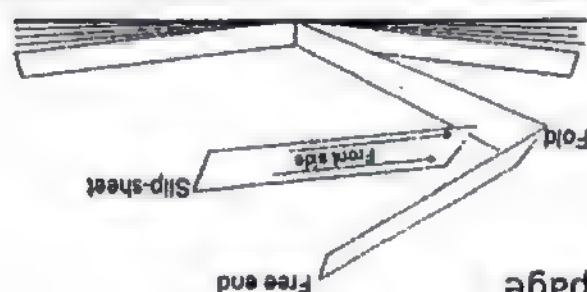
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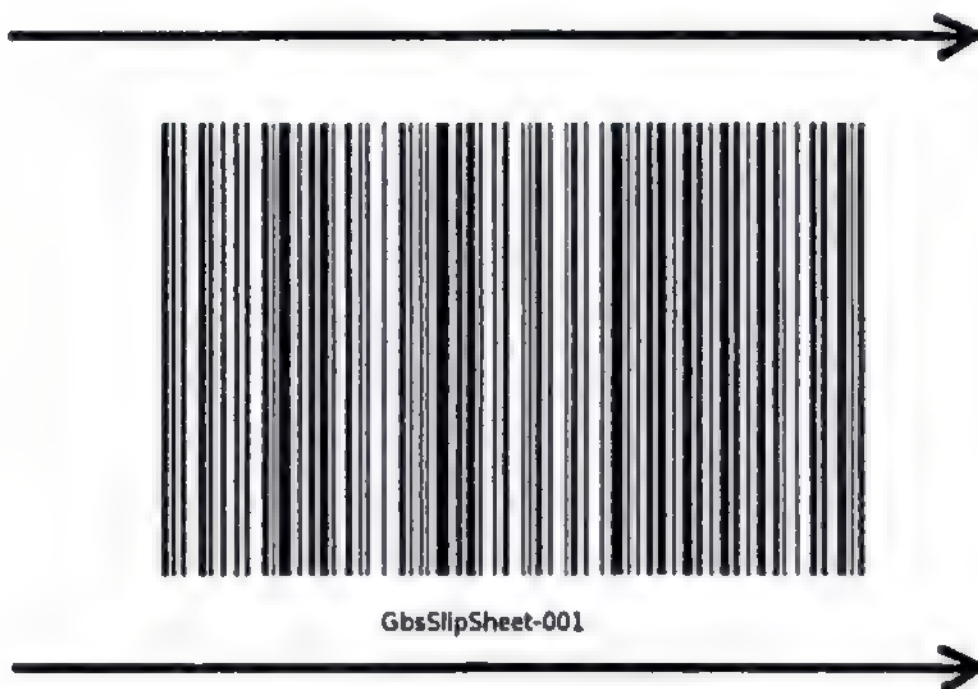
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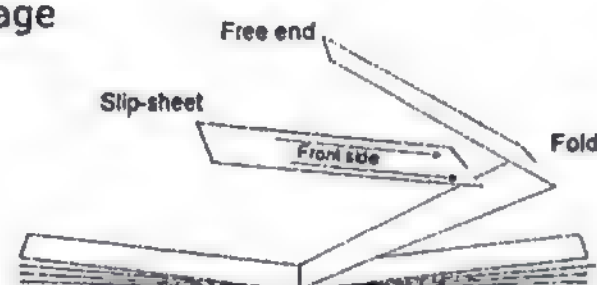
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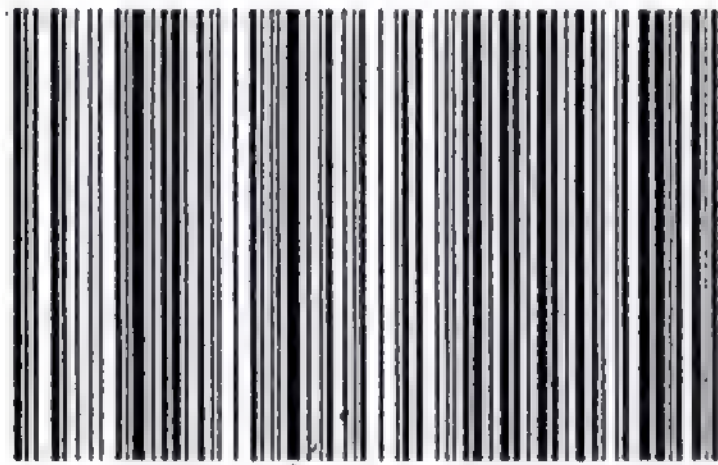
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Back

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How about memory. Today's more powerful software is increasingly memory hungry. That's why many ZEOS '386 packages come standard with 4 full Megabytes of memory. And this is high speed Zero-Wait State memory too. Now that's a window to the future! Speaking of windows, how about this.

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Sim the B

10 Good Reasons To Buy From ZEOS®

Reason #1

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As *PC Magazine* said "Price is always a consideration. So are benchmark test results. But both factors can be deceiving, which is why we consider them in the context of other aspects that will make the difference months and years down the road."

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In one recent '386 review, *PC Magazine* awarded ZEOS Editors Choice. "The ZEOS '386 blows away every other computer... a smart choice" is what they said. And in another recent review, *Government Computer News* said the ZEOS 33MHz '386 is "arguably the fastest MS-DOS and OS/2 micro in the world."

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Reason #3

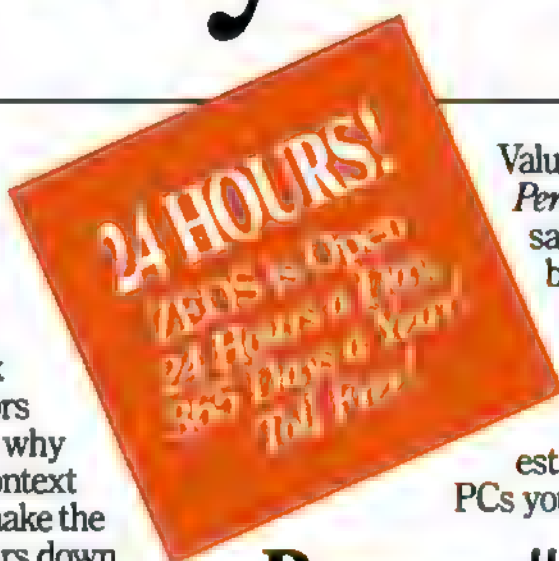
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Value: Excellent." *Personal Computing* said, "ZEOS... is the best value we've come across... its performance is right up there with the slickest, most expensive PCs you can buy."

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Reason #7

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Reason #8

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ZEOS systems are easy to buy. You can pick up the phone any time of the day or night and order your new ZEOS computer. And we accept MasterCard, Visa, American Express, and Corporate Purchase Orders from Fortune 1000 Companies, Colleges, Universities and Governments. Complete Leasing Programs are available as well.

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- ☐ **JOINT CREDIT** with another person. Complete entire application.
- ☐ **INDIVIDUAL CREDIT** but rely on income or assets of another person as a basis for repaying the credit requested. Complete entire application.
- ☐ **INDIVIDUAL CREDIT.** Do not complete Section C.*

*If you are a married Wisconsin applicant, you must provide your spouse's information as indicated, even though your spouse may not be signing the contract.

NOTICE TO WISCONSIN APPLICANTS: YOU MUST DISCLOSE YOUR MARITAL STATUS:

☐ married ☐ unmarried ☐ legally separated

A. YOUR PERSONAL INFORMATION

Name _____

Home Phone (_____) _____

Soc. Sec. No. _____ Date of Birth ____/____/____

Address _____ Apt. _____

City _____ State _____ Zip _____

Since? (Mo./Yr.) _____ ☐ Buy ☐ Rent ☐ Other _____

Previous Address _____

Employer _____ Since? (Mo./Yr.) _____

Monthly Gross Salary \$ _____ Bus. Phone (_____) _____

Previous Employer _____ From - To _____

Income from alimony, child support or separate maintenance payments need not be disclosed if you do not wish to have it considered as basis for repaying this obligation.

Additional Monthly Income \$ _____ Source: _____

Name & Address of Nearest Relative Not Living With You _____

Relationship _____

C. JOINT APPLICANT INFORMATION

Joint Applicant's Name _____

Soc. Sec. No. _____ Date of Birth ____/____/____

Address _____ Apt. _____

City _____ State _____ Zip _____

Home Phone (_____) _____ Date of Residence (Mo./Yr.) _____

Joint Applicant's Employer _____ Since? (Mo./Yr.) _____

Bus. Phone (_____) _____ Monthly Gross Salary \$ _____

D. SELF-EMPLOYMENT INFORMATION

Business Name _____

Type of Business ☐ Proprietorship ☐ Partnership ☐ Corporation

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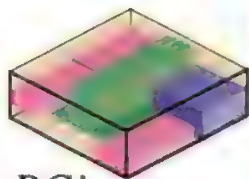
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Apricot Qi 300-80 Apricot Qi PCi

APRICOT IN CANADA INC.
by Bruce Brown



Apricot is relatively new to the United States, but the company's carefully designed computers should make a name for themselves fairly quickly. Security provisions available on the Apricot Qi (pronounced "key") 300-80 and PCi add to their appeal as network workstations in organizations where data and system security is of paramount concern.

The Qi 300-80 is a 16-MHz 80386SX system that sells for \$5,190 in a standard configuration with 2MB RAM and an 80MB hard disk. The standard configuration of the Qi PCi, a 25-MHz 386 (DX) with 4MB RAM, a 64K RAM cache, and a 120MB hard disk, costs \$8,090. Both MCA systems include a 1.44MB floppy disk drive, built-in Ethernet and VGA circuitry, a color VGA monitor, one parallel and one serial port, a mouse port, and DOS 4.01.

The standard and optional security measures provided with the systems grew out of a contract Apricot had with the United Kingdom Department of Defense, which ordered workstations that would be secure from all but the most sophisticated intruders or snoops. In line with its goal of providing optimum security, the Apricot cases have a system keylock on the back. And the company doesn't follow the common practice of using a relatively limited set of key patterns; the key pattern for each individual Apricot computer is

COVER STORY MCA COMPUTERS

unique. If you lose the keys to your computer, new keys must be cut at the factory from patterns stored on a secured PC.

Additionally, our test systems came with the \$295 Key Security Software option, a bundle composed of security software, an infrared hardware key, Microsoft Windows (Version 2.11), and a Microsoft Mouse. The infrared remote-key device can be required to activate the computer, and it also activates the Windows-based security program that prevents unauthorized access to your system.

COMMON COMPONENTS

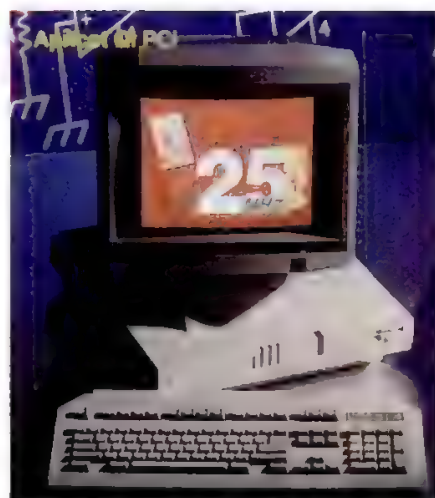
There is no difference between the 386SX and 386DX-based systems other than their motherboards, and even here the most important components are identical. For instance, in each case Apricot uses the Chips and Technologies 386 chip set and video controller chip as well as Phoenix's ROM BIOS. Most of the device controllers that usually take up expansion slots are built into the Apricot units' motherboards, including the floppy disk drive controller, the video and Ethernet circuitry, I/O device controllers, and parallel, serial, and mouse ports.

Apricot uses the same case on all its computers, including earlier 286-based machines and newer 486 models. The small-footprint case measures 5.25 by 15.5 by 16.75 inches. All the systems' pieces are obviously and pleasingly designed to fit together. For example, the case slopes down to the front but has a dormer-like platform especially designed to act as a base for the Apricot monitor. The 101-key keyboard with 72-inch cable is notched on the back corners to fit snugly to the system case.

Inside the case, Apricot's standard setup includes a 145-watt power supply with three device leads and space for three 3.5-inch storage devices: the standard hard and floppy disk drives and an optional tape unit. Apricot currently sells a 40MB tape backup system for \$675, but it will be offering 60MB and 125MB units by the time this article is in print. Apricot also plans to expand the hard disk options to include SCSI 200MB and 320MB disks.

MINOR DIFFERENCES

There are a few differences between the two machines. The SX-based Qi 300-80 can hold up to 8MB of RAM on the motherboard using proprietary 100-nano-



second memory modules. For additional memory (up to 16MB), you need to add a third-party, 16-bit MCA expansion card that uses the same interleaved page-mode memory scheme that the motherboard memory slots use. On the motherboard, there is also a slot for an 80387SX math coprocessor. Apricot plans to introduce a faster, 20-MHz unit—as soon as 20-MHz SX chips become widely available—to



Apricot in Canada Inc., 111 Granton Dr., #401,
Ridgemoor Hill, Ontario, Canada L4B 1L5;
(416) 492-2777.

Apricot Qi 300-80

List Price: With 2MB RAM, 80MB hard disk, 1.44MB 3.5-inch floppy disk drive, 16-bit VGA card, one parallel and one serial port, mouse port, Ethernet circuitry, DOS 4.01, \$4,495; with VGA monitor, \$5,190; with Key Security system, including Microsoft Windows 2.11 and Microsoft Mouse, \$5,485.

In Short: The Apricot Qi 300-80 is a bit costly for a single-user 16-MHz 80386SX machine, even with the promise that the same machine will come with a 20-MHz processor at the same price. This well-designed computer with complementary components and integral security features makes an appealing workstation.

CIRCLE 603 ON READER SERVICE CARD

Apricot Qi PCi

List Price: With 2MB RAM, 120MB hard disk, 1.44MB 3.5-inch floppy disk drive, 16-bit VGA card, one parallel and one serial port, mouse port, Ethernet circuitry, DOS 4.01, \$6,995; with 4MB RAM, VGA monitor, \$8,090; with Key Security system, including Microsoft Windows 2.11 and Microsoft Mouse, \$8,385.

In Short: Apricot's 25-MHz 386 version of its high-security small-footprint computer provides plenty of power in a compact package. Available only through VARs and system integrators, this PC has security features that are hard to beat.

CIRCLE 604 ON READER SERVICE CARD

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sell at the same price as the 16-MHz model.

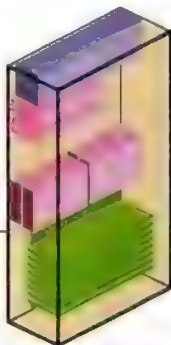
The 25-MHz Qi PCi has a 64K 35-ns. RAM cache, and it can take up to 16MB of RAM on the motherboard using faster 80-ns. SIMMs. The system can support an 80387/25 or Weitek math coprocessor but not both. Whenever more than 1MB of RAM is installed in either Apricot system, the system defaults to ROM BIOS shadowing. If you prefer not to use the memory this way, you can turn it off.

Apricot systems are sold largely through VARs and system integrators. The standard parts-and-labor warranty is good for one year, and on-site service contracts are available at extra cost.

One strong point of the Apricot systems is their consistent hardware platform. The only differences in Apricot's 286, 386SX, 386, and upcoming 486 systems are the motherboards, so upgrades from one machine to a higher-end model are reasonably simple. While Apricot systems are priced at a premium to cover the security features and the array of standard components, if you need a high-security LAN workstation, these systems deserve a close look.

IBM PS/2 Model 65SX

IBM CORP.
by Bruce Brown



Just because no other company pushes an 80386SX-based computer as a file server doesn't mean that IBM's idea is a bad one. After all, it was only four or five years ago that people were running small networks of eight to ten PCs for simple applications like word processing, using 8- or even 6-MHz ATs as file servers. For anyone who plans to use a network for relatively light work today, IBM's PS/2 Model 65SX offers plenty of memory and drive expansion room for a good deal less than the price of the company's Model 80 servers.

The 16-MHz Model 65SX comes in a tower case measuring 23.5 by 6.5 by 19 inches. The legs fold out on the bottom for stability. The standard configuration lists for \$6,395, including 2MB RAM (the motherboard can hold 8MB, and the system a total of 16MB), a 60MB hard disk, a 1.44MB floppy disk drive, an IBM 8515 VGA monitor, one parallel and one serial port, a mouse port, a 101-key keyboard, and DOS 4.01.

While our tested system wasn't exactly maxed out, it wasn't skimpily equipped either. It included 6MB of RAM on the motherboard and 8MB on an expansion card. The motherboard also has a slot for an 80387SX/16 math coprocessor, which IBM sells for \$795. Eschewing the standard video, IBM packaged the system with an 8514A 1,024 by 768 display adapter to work with the 8515 monitor. The hard disk was a 120MB model, and other goodies included a 3270 emulation card and an internal IBM CD-ROM player. The CD-ROM unit is a particularly apt accessory for a file server with second-tier performance: since CD-ROM devices are notorious for wasting processor and system time because of their relatively slow access of massive storage, they are not exactly sought after in top-of-the-line, 25-MHz 386 file servers.

The price for all this? \$18,617. That high figure is explained largely by the fact that going from the standard 2MB of RAM to 14MB costs \$8,280 at IBM's list price. Unfortunately, you can't use off-the-shelf memory with this machine; you must use IBM's proprietary-design memory modules. Here's hoping you can get big discounts.

HOMEMADE WITH ROOM TO GROW

IBM makes most of the components used in the Model 65SX, including the motherboard, the ROM BIOS, the hard disk and



FACT FILE

IBM PS/2 Model 65SX

IBM Corp., Old Orchard Rd., Armonk, NY 10604; (800) 426-2468.

List Price: With 2MB RAM, 60MB hard disk, 1.44MB 3.5-inch floppy disk drive, 16-bit VGA card, one parallel and one serial port, mouse port, \$5,295; with 8515 VGA monitor, DOS 4.01, \$6,395; with 14MB RAM, 122MB hard disk, 3270 card, 8514/A 1,024 by 768 video card, CD-ROM player, \$18,617.

In Short: The IBM PS/2 Model 65SX is awfully expensive when loaded with options, as in our tested configuration, but this solid tower-case machine has plenty of expansion space and can function as a small-network file server when top performance isn't essential. Heavy discounts are probably available.

CIRCLE 806 ON READER SERVICE CARD

its controller. The floppy disk drive in the test machine was manufactured by Mitsubishi. IBM makes the rugged 250-watt power supply, which, like that on the Model 80, extends from front to back at the top of the vertical case. The case is the same style the Model 80 uses; you can open it using a dime for a screwdriver and take most of it apart with your hands alone. This system may be expensive, but it's simply and beautifully built.

If you decide to stuff a 65SX with storage devices, you'll find lots of room. You can put in one full-height and two half-height drives, as well as four 3.5-inch drives. The 65SX has more space for expansion cards than IBM's small-footprint PS/2s do; it offers eight 16-bit MCA slots. Even our stuffed test unit had three free slots.

IBM sells systems directly, through its dealers, and through IBM Business Partners (companies that have developed hardware or software products that work in conjunction with IBM computers). The standard warranty is for one year, including parts and labor. You can have repairs made at any authorized service center, and if you choose, you can always ship IBM hardware directly to the manufacturer (no matter what you've heard, you can do this). Most dealers also offer on-site service contracts.

Using an SX as a file server is an interesting concept, but you have to question whether the IBM machine offers any price advantage. While the Model 65SX certainly has the drive and slot expansion capability to let it function in a network or multiuser situation, the \$6,395 standard-configuration price is rather high, and the cost of memory expansion is especially

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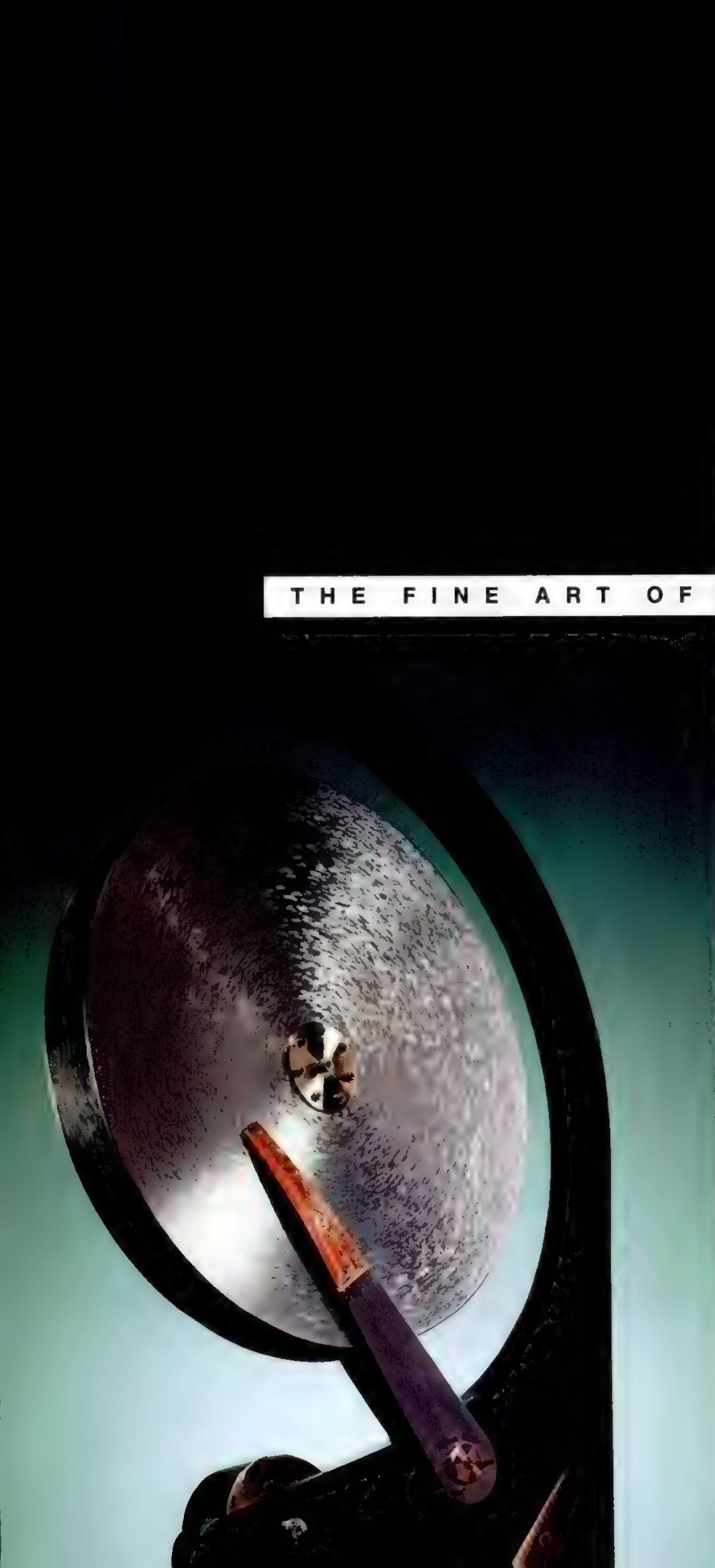
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CACHING IN BIG

by John C. Dvorak

Hardware caching is a way to increase system performance without spending a lot of money. It is necessary only on relatively new, high-speed machines whose memory banks are too slow to feed and receive data as fast as the processor would like. A cache machine has a minimal amount of expensive high-speed memory acting as an expeditor between the processor and the sluggish low-speed main memory. If you loaded a fast machine with 20-nanosecond main memory, a cache would be unnecessary. But this proposition is too expensive and hard to justify, especially when compared with the cost benefits of a cache.

A hardware cache operates under the "locality of execution" principle, which makes one assumption: what the processor is likely to reach for in main memory will be within a few kilobytes of what it reached for previously. By loading all the data within, say, a 32K vicinity into a high-speed cache memory, the processor can spend most of its time running full tilt in and out of the cache rather than the slower main memory. A "hit" occurs every time the processor goes to the cache instead of main memory.

An old rule of thumb, developed by Intel in 1985, says that a 32K direct-mapped cache will have an 86 percent hit rate. A 64K cache has an 89 percent hit rate. From there, the hit rate inches toward 100 percent, achieved at 640K—when the entire machine could be using high-speed memory.

The most controversial issue surrounding cache memory concerns its size. While hit rates do increase in proportion to cache size, does having a big cache—say, 128K or 256K—really matter? Does a large cache really accomplish much, except in a multitasking environment where a small cache would be constantly flushed?

Certainly, vendors often take the opportunity to trumpet their caching schemes. A 256K cache should show only an incremental improvement in speed, but that's enough that a manu-

Caches are important for getting the most out of newer systems with fast processors. But do larger caches significantly increase performance?

facturer can claim superior performance. Theoretically, the bigger the cache, the more likely it is to do well on any benchmark test that starts to require large chunks of memory.

I'm impressed by the performance gain of the on-board 8K cache that the 486 chip uses. The on-chip cache is a whole new approach as the distance the electrons have to travel from memory to processor becomes an issue in high-speed environments.

It's hard to say what cache size to recommend to most users. Personally, I like to go by the feel of the machine. While benchmark-test numbers for 128K- or 256K-cache machines can be impressive, I can't say that these machines "feel" any faster than a 32K-cache machine when I compare them side by side using various applications. Of course, all of them feel faster than machines with no cache, but sometimes the large-cache machines actually seem slower than the others!

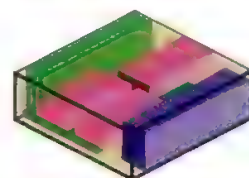
Most engineers agree that the specific application you use most will determine what size cache best suits you. You can also benefit from an opportunity to play with various machines to find out what you really need. In theory, at least, a 32K cache should do the job for most users in most applications. It's also the cheapest solution.

For now, with exceptions, cache size is mostly a marketing game. We know that benchmark tests don't show the effects of caching in real-world situations. Yet today's popular tests, which show impressive numbers for many large-cache machines, will probably make them fashionable (if they're priced to compete against small-cache machines), even among users who don't really need them. ■

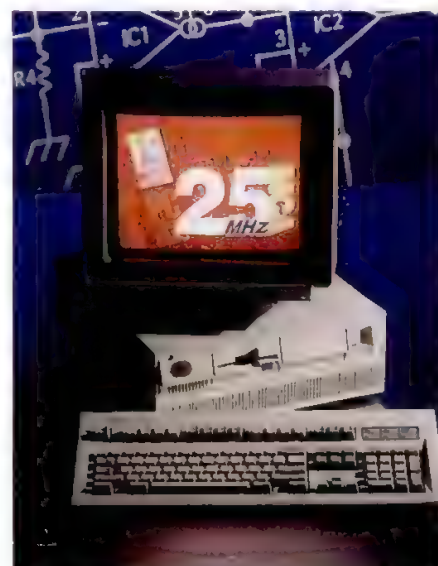
tough to swallow. You can buy other brands' 386SX or even DX units for a lot less, and you will usually have the advantage of being able to use off-the-shelf RAM, at a current street price of about \$100 per megabyte.

Even with the heavy discounting often available through IBM dealers (30 percent or more is not unusual), the PS/2 Model 65SX remains an expensive solution. But if you're a straight IBM house and you want IBM's obvious engineering quality, this model makes sense for use as a server in a small department.

IBM PS/2 Model 70-A21



IBM CORP.
by Bruce Brown



IBM is, of course, the standard-bearer in the MCA arena. It introduced Micro Channel architecture to the world back in 1987, and today the 25-MHz IBM PS/2 Model 70-A21, its fastest 386 machine to date, enjoys well-deserved acclaim for its engineering and small-footprint design. The Model 70-A21 certainly isn't the fastest 386 around, nor is it the most expandable or least expensive. And it hasn't been without its problems: in 1989 the line was the focus of negative attention brought on by a run of machines with faulty memory module connectors. Yet the Model 70-A21 remains a strong force in the MCA marketplace.

In its standard configuration, the Model 70-A21 costs \$11,490, including 4MB

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FAST FILE

IBM PS/2 Model 70-A21

IBM Corp., Old Orchard Rd., Armonk, NY 10604; (800) 426-2468.

List Price: With 2MB RAM, 120MB hard disk, 1.44MB 3.5-inch floppy disk drive, 16-bit VGA card, one parallel and one serial port, mouse port, \$8,995; with 4MB RAM, VGA monitor, DOS 4.01, \$11,490; with 6MB RAM, 80387/20 coprocessor, \$14,115.

In Short: IBM's PS/2 Model 70-A21 remains the standard for fast Micro Channel architecture. This 25-MHz 386 computer stuffs a lot of power into a well-engineered, small-footprint package. It isn't the fastest 386 on the market nor the most expandable, but it works.

CIRCLE 605 ON READER SERVICE CARD

RAM, a 120MB hard disk, a 1.44MB 3.5-inch floppy disk drive, IBM's own Model 8515 color VGA monitor, and DOS 4.01. Our test machine, with 6MB of RAM and an 80387/20 math coprocessor, lists for \$14,115.

The IBM-made motherboard uses an Intel 386 chip set in conjunction with an Intel 82385 cache controller to manage the 64K 25-nanosecond cache memory. You can put up to 8MB of standard RAM on the motherboard, using 2MB IBM SIMMs. The Model 70-A21 can use 16-, 20-, or 25-MHz 80387 math coprocessor chips because the coprocessor runs asynchronously to the CPU. There is no provision for a Weitek coprocessor.

The Model 70-A21's compact size belies the power within. Inside the case, its few components are small, neat-looking, and held in place by tough plastic levers. You can remove the hard and floppy disk drives in seconds. Other components—the motherboard, memory modules, and so on—can be removed from the case just as easily. With practice, you can probably separate or put together all the major modules in a couple of minutes. Try that with most small-footprint computers!

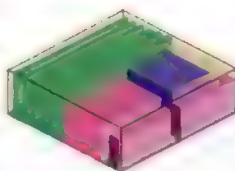
One of the reasons the high-powered Model 70-A21 seems sparsely populated is its integration of components on the system board. Built-in ports include a parallel port, a 25-pin serial port, and a PS/2 mouse port. The video adapter and the hard and floppy disk controllers are also built in—no separate interface cards needed here. The power supply puts out a maximum of 132 watts, which is enough for the standard components and the few that can be added (there is room for three extra storage devices). Only three expansion slots are found in the machine: two

are 16-bit, and one is a 32-bit slot that will accept a memory card to bring the system to its 16MB maximum.

Like all IBM personal computers, the Model 70-A21 is sold by authorized dealers as well as by IBM Business Partners and IBM's direct sales force. The standard warranty is for one year, covering parts and labor on a carry-in basis. IBM also offers many service contract options.

When the Model 70-A21 came out, its 25-MHz processor in a small-footprint case delivered exceptional power for the single user. Today, with other 25-MHz machines available that are faster and more amenable to expansion, the Model 70-A21 is not quite such a leading-edge machine. You wouldn't want to use it as a serious file server because of the lack of room for card and drive expansion. Yet although it has been surpassed in some areas, it remains a finely constructed workstation that leaves you a good amount of desk space. At the same time, despite price cuts within the past year and the discounts you can usually get from IBM dealers, the system still sports a pretty significant price tag, and a further reduction would be welcome.

Memorex Telex 7270 Intelligent Workstation



MEMOREX TELEX CORP.

by M. David Stone



The small-footprint Memorex Telex 7270 Intelligent Workstation has much in common with the Mitac MPS3000F also reviewed here. Both 386 25-MHz systems use the same Mitac motherboard and the same chassis. If you take their covers off and set them side by side, you'll be tempted to ask, "Is it Mitac or is it Memorex?" Their similarities don't extend to price, but the premium you'll pay for the Memorex Telex system gets you a notable level of support.

In *PC Magazine's* standard configuration, the Memorex Telex offering is a hefty \$9,790—almost \$3,000 more than the similarly configured Mitac unit. For this price, you get 4MB of RAM, 32K of 25-nanosecond cache (a 64K cache is not available), an 18-millisecond 107MB Microscience hard disk, a 1.44MB 3.5-inch floppy disk drive and its controller, and a Tatung VGA monitor with a Memorex Telex label, plus parallel, serial, and mouse ports, and DOS 4.01. Memorex Telex added a 1.2MB floppy disk drive to the test configuration, for a total price of \$10,035. The \$6,495 base price leaves out the hard disk, the additional drive, and the monitor.

NEARLY IDENTICAL TWINS

Physically, the Memorex Telex 7270 is identical to its Mitac near-twin. The unit measures 6.25 by 14.75 by 16.5 inches (HWD), with the power switch, reset switch, and keyboard lock all placed on the front panel. In the back, you'll find the three ports and a PS/2-style keyboard connector.

Open the Memorex's box and you'll find the same bay arrangement as in the Mitac, with two 5.25-inch half-height bays and one 3.5-inch bay in the front of the system, plus one 3.5-inch bay in the back by the power supply. This second 3.5-inch bay is a welcome touch: your 3.5-inch hard disk goes there, and you still have three bays accessible in the front of the system.

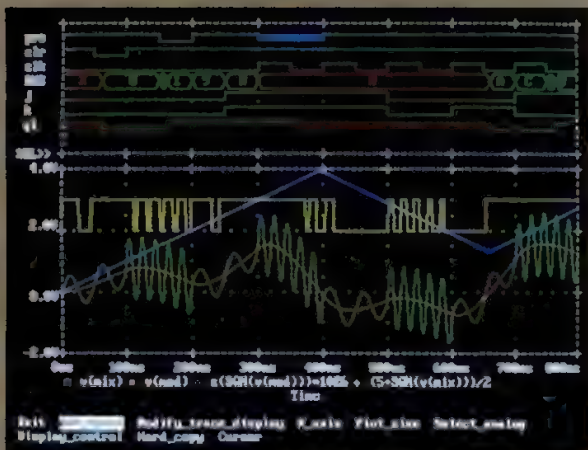
The Mitac motherboard includes an Intel chip set, a Phoenix BIOS, and a coprocessor socket for an 80387 or Weitek 3167. Four of the tested unit's eight SIP sockets were filled with 1MB SIP modules, yielding 4MB for the system. Memorex Telex says that if you need more than the 8MB of RAM that fits on the motherboard, you can add a memory board from almost any third-party vendor. In addition to the two 32-bit slots suitable for memory boards, you'll find three standard 16-bit

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The PSpice circuit simulator is an integrated package for the analysis of electronic and electrical circuits. The software enables you to create a "computer breadboard" of your circuit for testing and refinement *without* building hardware.

A wide variety of circuits can be analyzed using PSpice. These range from precision instrumentation amps, to microwave mixers, to switching power supplies, to digital control circuits. Our capability to analyze mixed analog/digital circuits is unique within the industry.

Introduced over six years ago, MicroSim's PSpice has more copies sold than all other SPICE based programs combined. PSpice has a reputation for extensive capabilities, accurate results, diverse options, and availability across a range of computer platforms. PSpice includes an extensive device library of 3,000+ analog parts and 1,200+ digital parts, at no extra charge.

The PSpice options include:

Digital Simulator, which allows the simulation of mixed analog/digital circuits with feedback between the analog and digital sections.

Monte Carlo Analysis, which calculates the variations in a circuit's performance allowing for component tolerances. This option performs statistical analyses: Monte Carlo, Sensitivity, and Worst Case.

Analog Behavioral Modeling, which allows you to describe analog components, or entire circuit blocks, using a formula or a look-up table.

Probe, which acts as a "software oscilloscope" to provide an interactive viewing environment for simulation results (see photo).

Parts, which is a parameter extraction program allowing the extraction of device model parameters from data sheet information.

PSpice is available on the PC family (running DOS, Protected Mode DOS, or OS/2), Macintosh II family, Sun 3, Sun 4, and SPARCstation families, HP/Apollo series 2500, 3500, and 4500 workstations, DECstation 2100, 3100, and 5000, and the VAX/VMS family.

Advanced Filter Designer is an interactive design aid for the synthesis and analysis of active filters. Available filter types include low pass, high pass, band pass, and band reject, all of which may be synthesized using Butterworth, Chebyshev, Inverse Chebyshev, and Elliptic (Cauer) functions. There is also the capability to synthesize arbitrary transfer functions and delay equalization filters. For those who do not need all features of the Advanced Filter Designer, a less sophisticated Standard Filter Designer package is available. Standard Filter Designer includes all of the features of the Advanced Filter Designer, except for the capability to synthesize arbitrary transfer functions and delay equalization filters.

Each copy of our Circuit Analysis and Circuit Synthesis programs comes with our extensive product support. Our technical staff has over 150 years of experience in CAD/CAE, and our software is supported by the engineers who wrote it.

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20 Fairbanks • Irvine, CA 92718 USA • FAX (714) 455-0554

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SUMMARY OF FEATURES: MCA-BASED PCs

Price of standard configuration For 386SX MCA computers, our standard configuration includes 2MB RAM, a 60MB hard disk or the closest available approximation, one high-density floppy disk drive, a color VGA video display, at least one parallel and one serial port, a keyboard, and DOS. For 386 (DX) MCA computers, we increase the requirement to 4MB RAM and a 100MB hard disk.

In some instances, manufacturers do not offer the exact configuration *PC Magazine* requested, but all 12 of the PCs reviewed here provide a reasonably close match for this list of requirements. Check each machine's fact file for a more exact indication of what is included at the quoted price.

Distribution channel Some machines are sold directly through mail order. When machines are sold by dealers, the purchaser may find discounts of 25 percent or more off the list price (although there is no guarantee that the discounts will run this high).

Case type indicates whether each computer has a small-footprint, desktop, or tower design.

Chip set manufacturer indicates which company makes the support logic that connects the CPU with the other functions managed by the system board. Chip sets that employ VLSI (very large-scale integration) technology reduce the discrete component count, which in turn helps to reduce power consumption and increase component life. In some cases the computer uses discrete logic rather than a chip set.

The **system RAM arrangement** is the method in which memory is addressed. The design of system RAM aims at avoiding the wait states imposed when CPU speed outpaces conventional memory speed.

Interleaved memory increases processing speed by dividing the memory into two or four portions that process information alternately. The CPU sends information to one section for processing while another section goes through a refresh cycle.

Page-mode memory allows back-to-back memory accesses within blocks of memory called pages, avoiding wait states.

Row/column is the traditional method of accessing data at a memory address. RAM is mapped as a matrix, and a particular address is given using a row and a column number.

Wait states On the average, most machines run at between zero and one wait state. The figures printed here were supplied by the respective manufacturers.

Maximum installable RAM Separate rows indicate the maximum 32-bit memory possible

on the motherboard and on a dedicated memory board.

RAM packaging (and rated speed) Memory chips come in a variety of styles: DIPs, SIPs, SIMMs and SMDs.

The *dual in-line package (DIP)* is the traditional buglike computer chip sprouting 8, 14, 24, 40, or more metal legs (evenly divided between right and left sides).

Single in-line packages (SIPs) are single-package arrays of computer chip logic assembled so that all connecting legs are in a straight line, like the teeth on a comb. They can be individual chips or multiple chips on a small card, with a proprietary SIP connection.

Single in-line memory modules (SIMMs) consist of individual logic devices installed on their own small circuit board, creating a component module that can be plugged into a larger device. Their physical arrangement facilitates easy installation and replacement.

Surface mount devices (SMDs) hold logic circuitry in a reduced-size case, mounted directly on the motherboard.

Installed chip size Kb and Mb refer to kilobits and megabits, respectively.

The **BIOS version and date** can affect PC Labs' benchmark test results. Those purchasing the same machine with a different BIOS version may encounter some variations in performance.

Setup can reside either on a floppy disk or in ROM.

Shadowing Shadow RAM is a technology that loads system BIOS and/or video BIOS directly into fast RAM on boot-up of the computer, offering enhanced performance speed. This feature uses the 384K of system memory located between the boundary of conventional memory and the end of the first megabyte of installed RAM. The ability to disable shadowing is important with some applications to resolve memory conflicts.

Hard disk interface Within the 386 PC environment, the three most common hard disk interfaces are *ST-506*, *SCSI (small computer system interface)*, and *ESDI (enhanced small device interface)*. ST-506 uses one of two data encoding methods, *RLL (run length limited)* and the older *MFM (modified frequency modulation)* scheme. All data is encoded onto and read from your hard disk as a series of polarity-reversing bits representing ones and zeros. The MFM format uses nine such bits to store the same amount of data that RLL can store with only six polarity changes.

Both SCSI and ESDI require special hard disk controllers and cannot run off existing PC-XT or PC AT controllers. A new interface

that offers good performance at a lower price than ESDI or SCSI is *IDE (integrated drive electronics)*.

Hard disk options We are listing up to four of what we believe are the most popular disk choices.

Bus speeds The higher the bus speed, the faster the bus can transfer information, allowing you to make the most of a fast micro-processor. MCA expansion boards are designed to operate at a speed of at least 10 MHz; thus, any bus that runs at 8 or 10 MHz should be compatible with any MCA expansion board.

The **display circuitry** can be either on an expansion card or on the motherboard. Motherboard circuitry is often faster, but if it cannot be disabled it prevents upgrades.

Interface 16-bit video interfaces are typically faster than 8-bit because of their wider bandwidth.

Software available The availability and price of DOS 3.3 and 4.01 are listed here. If no price is shown, the base-priced system includes DOS. (*PC Magazine's* standard configuration includes DOS 4.01—or, if it is not available, DOS 3.3—to allow more accurate price comparisons.)

Where OS/2 is available, the version number and list price are provided.

Disk caching software Some companies provide software to facilitate data retrieval from the hard disk. This software speeds overall system performance by anticipating what data the processor will need next.

An **expanded memory manager** is software that emulates the Lotus/Intel/Microsoft (LIM) expanded memory manager within the extended memory of a 386 or 386SX PC.

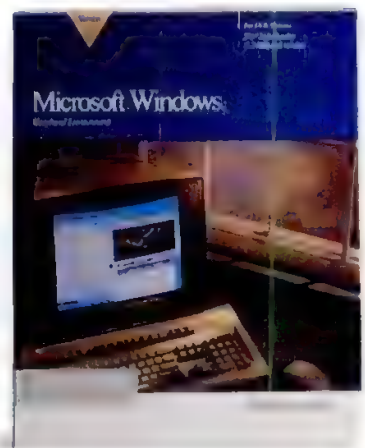
Dual voltage on the power supply permits a computer's use in both the United States and Europe.

Number of device connectors indicates how many internal storage devices the system can support without the use of Y cables (power splitters).

FCC certification class Two classes of FCC (Federal Communications Commission) approval, Class A and Class B, may be given to computers. Class A approval signifies that a computer has sufficiently low radio-frequency emissions for operation in a business locale. The more stringent Class B rating allows home use as well, where computers are likely to be placed near radios and television sets.

CONTINUES

How to upgrade your favorite Windows programs for \$99.*



With ATM software, you get more than you pay for. Including software for these 13 popular fonts, which cost hundreds of dollars if purchased separately. But there are more ways to save—check out the Adobe® Plus Pack for \$198.* Along with ATM, it completes the full set of 35 fonts found in most PostScript printers. Or try Adobe Type Set™ 1, 2 or 3—each with 7 to 11 fonts for just \$99-\$198.*

Included with ATM:

**Times™ Roman, *Italic*,
Bold, *Bold Italic***

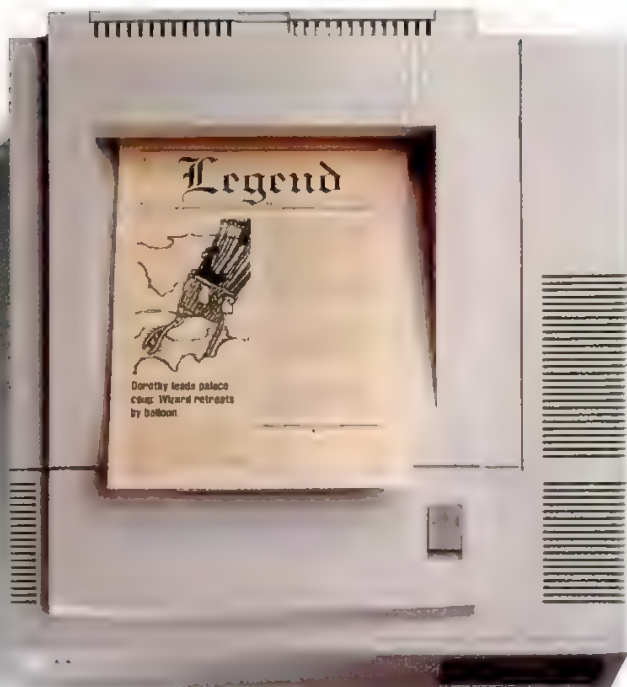
**Helvetica™, *Oblique*,
Bold & *Bold Oblique***

**Courier, *Oblique*,
Bold, *Bold Oblique***

Symbol ΩΥΦ&®™♣♠♣



Now your HP LaserJet™ can use the same high-quality fonts only PostScript printers could use before. Plus, your dot matrix or other non-PostScript printer will give you near-laser quality output using the same PostScript language fonts. And since ATM software works with your existing printer drivers, there's no need to modify files.



Name your favorite Windows 3.0 programs, then think about how one \$99* software program can upgrade them all at once. It's almost too good to be true.



Introducing Adobe Type Manager for Windows 3.0.

Adobe Type Manager® software is the amazing new program that does everything you see here. And does it with virtually any Windows 3.0 application.

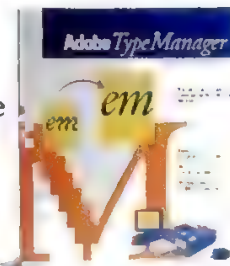
For starters, ATM® software dramatically improves the quality of all your on-screen text. But that's just half the story. Because it also gives you near-laser quality type from your dot matrix or other non-PostScript® printer. And if you're fond of fonts, you should know ATM even allows you to use literally thousands of typefaces in just about any size imaginable.

You see, once ATM is installed in your system—a one-time only procedure that takes just minutes—it works automatically with your Windows 3.0 applications to create text "on the fly."

Which means you can forget about building bitmapped

screen fonts. Since ATM delivers unlimited sizes of scalable type instantly, you won't have to bother with bitmapped font cartridges either.

We could go on. But why tell you how Adobe Type Manager can upgrade your Windows 3.0 programs when we can show you? Once you've seen for yourself, call 1-800-344-8335 or your Adobe Authorized Dealer. (Outside the U.S.A. and Canada, call your local distributor.)



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COVER STORY

MCA COMPUTERS



SUMMARY OF FEATURES: MCA COMPUTERS

Products listed in ascending price order

	NCR Workstation Products Division NCR PC386sx/MC ₂₀	Apricot in Canada Inc. Apricot QI 300-80	Reply Corp. Reply 386SX/20	Wang Laboratories Inc. Wang MC 350/16S	IBM Corp. IBM PS/2 Model 65SX
Price of standard configuration	\$4,844	\$5,190	\$5,335	\$5,790	\$6,395
Hard disk capacity	44MB	80MB	60MB	76MB	60MB
Distribution channel	Dealers, direct	Dealers	Direct	Dealers, direct	Dealers
TESTED CONFIGURATION					
Price	\$7,794	\$5,485	\$7,105	\$6,875	\$18,617
Microprocessor	20-MHz 80386SX	16-MHz 80386SX	20-MHz 80386SX	16-MHz 80386SX	16-MHz 80386SX
Case type	Small-footprint	Small-footprint	Small-footprint	Desktop	Tower
Dimensions (HWD, in inches)	5.2 x 15 x 16.6	5.25 x 15.5 x 16.75	5.5 x 14.2 x 16.5	5.4 x 18.4 x 14.4	23.5 x 6.5 x 19
Motherboard manufacturer	NCR	Apricot	Reply	Wang	IBM
Chip set manufacturer	Intel	Chips and Technologies	Chips and Technologies	Chips and Technologies	IBM
System RAM arrangement	Page-mode	Interleaved, page-mode	Interleaved, page-mode	Interleaved, page-mode	Interleaved
Wait states	0	0	0	0	0
MOTHERBOARD MEMORY					
Installed RAM	8MB	2MB	8MB	8MB	6MB
Maximum installable RAM	8MB	8MB	8MB	8MB	8MB
RAM packaging (and rated speed)	SMD (70 ns.)	DIP (100 ns.)	SIMM (80 ns.)	SIMM (100 ns.)	SIMM (80 ns.)
Installed chip size	1Mb	1Mb	1Mb	2Mb	1Mb
Other chips supported	4x256Kb	None	256Kb	1Mb	None
Accepts generic chips	☐	☐	☐	☐	☐
ADD-IN MEMORY BOARD					
Installed RAM	N/A	None	None	N/A	8MB
Maximum installable RAM	N/A	5MB	8MB	N/A	8MB
RAM packaging (and rated speed)	N/A	DIP (100 ns.)	SIMM (80 ns.)	N/A	SIMM (80 ns.)
Chip size	N/A	1Mb	1Mb	N/A	1Mb
Accepts generic chips	N/A	☐	☐	N/A	☐
PROCESSOR RAM CACHE					
Cache controller	N/A	N/A	N/A	N/A	N/A
Installed RAM	N/A	N/A	N/A	N/A	N/A
RAM packaging (and rated speed)	N/A	N/A	N/A	N/A	N/A
Chip size	N/A	N/A	N/A	N/A	N/A
BIOS					
BIOS version and date	Phoenix 1.02.07 (5/9/90)	Phoenix 1.02.18 (10/88)	Chips and Technologies 1.2 (7/18/90)	Phoenix 1.02.03/1.15.00 (10/10/88)	IBM (2/90)
Setup in ROM/Password in ROM	☒ / ☒	☐ / ☒	☒ / ☐	☐ / ☒	☐ / ☒
Video shadowing/Can be disabled	☒ / ☒	☒ / ☒	☐ / ☐	☒ / ☒	☐ / ☐
System shadowing/Can be disabled	☒ / ☒	☒ / ☒	☒ / ☒	☒ / ☒	☐ / ☐
HARD DISK					
Manufacturer	Conner	Quantum	Conner	Imprimis	IBM
Disk capacity	100MB	80MB	120MB	76MB	120MB
Interface	SCSI	SCSI	ESDI	ST-506	SCSI
Controller location	Motherboard	Card	Drive	Card	Motherboard
Controller manufacturer	NCR	Adaptec	Conner	Adaptec	IBM
Integrated floppy/hard disk controller	☐	☐	☒	☐	☐
Drive bays	3 one-third-height	3 3.5-inch	2 half-height, 3 3.5-inch	3 3.5-inch	1 full-height, 2 half-height, 4 3.5-inch
Hard disk options	44MB, 200MB (SCSI)	200MB, 320MB (SCSI)	325MB (ST-506); 30MB, 60MB, 120MB (IDE)	40MB (ST-506)	60MB (SCSI)

—Editor's Choice ☒—Yes ☐—No

N/A—Not applicable: the product does not have this feature.

COVER STORY

MCA COMPUTERS

American Mitac Corp. Mitac MPS3000F	Tandy Corp. Tandy 5000 MC	Advanced Logic Research Inc. ALR MicroFlex 3300	Apricot Inc. Apricot Qi PCI	Memorex Telex Corp. Memorex Telex 7270 Intelligent Workstation	Olivetti Office USA Olivetti P800	IBM Corp. IBM PS/2 Model 70-A21
\$6,875	\$7,628	\$7,909	\$8,090	\$9,790	\$11,475	\$11,490
100MB	150MB	120MB	120MB	100MB	135MB	120MB
Dealers	Dealers	Dealers, direct	Dealers	Direct	Dealers	Dealers
\$6,875	\$7,897	\$14,006	\$8,385	\$10,035	\$11,475	\$14,115
25-MHz 80386	20-MHz 80386	33-MHz 80386	25-MHz 80386	25-MHz 80386	25-MHz 80386	25-MHz 80386
Small-footprint	Desktop	Tower	Small-footprint	Small-footprint	Tower	Small-footprint
6.25 x 14.75 x 16.5	6.5 x 17 x 15.5	23 x 7.5 x 18.5	5.25 x 15.5 x 16.75	6.25 x 14.75 x 16.5	22.5 x 8.5 x 27	4.1 x 14.1 x 16.5
Mitac	Tandy	ALR	Apricot	Mitac	Olivetti	IBM
Intel	Intel	Intel	Chips and Technologies	Intel	Chips and Technologies	IBM
Interleaved, page-mode	Page-mode	Interleaved	Interleaved, fast page-mode	Interleaved, page-mode	Row/column	Row/column
0	0	0	0	0	0	0
4MB	N/A	N/A	4MB	4MB	4MB	6MB
8MB	N/A	N/A	16MB	8MB	16MB	8MB
SIP (80 ns.)	N/A	N/A	SIMM (80 ns.)	SIP (80 ns.)	SIMM (80 ns.)	SIMM (80 ns.)
1Mb	N/A	N/A	1Mb	1Mb	1Mb	1Mb
256Kb	N/A	N/A	256Kb	None	None	None
■	N/A	N/A	■	■	■	□
N/A	4MB	4MB	None	N/A	None	None
N/A	4MB	64MB	32MB	N/A	24MB	8MB
N/A	SIMM (100 ns.)	SIMM (80 ns.)	SIMM (80 ns.)	N/A	SIMM (80 ns.)	SIMM (80 ns.)
N/A	256Kb, 1Mb	256Kb, 1Mb	2Mb, 4Mb	N/A	1Mb	1Mb
N/A	■	■	□	N/A	■	□
Intel 82385-25	Intel 82385	Intel, ALR	Apricot	Intel 82385-25	Intel 82385	Intel 82385
32K	32K	128K	64K	32K	64K	64K
DIP (25 ns.)	DIP (25 ns.)	DIP (25 ns.)	DIP (35 ns.)	DIP (25 ns.)	DIP (25 ns.)	DIP (25 ns.)
32Kb	2Kb	64Kb	64Kb	32Kb	64Kb	64Kb
Phoenix 1.02.00 (Mitac R2.10.10B) (10/88)	Phoenix 1.02.04 (7/29/88)	Phoenix 1.02.08 (10/88)	Phoenix 1.02.17 (10/88)	Phoenix 1.02.00 (Mitac R2.10.10B) (5/88)	Olivetti (10/89)	IBM (2/89)
□ / ■	□ / □	■ / □	□ / ■	□ / ■	□ / ■	□ / ■
■ / ■	■ / ■	□ / □	■ / ■	■ / ■	□ / □	□ / □
■ / ■	■ / ■	■ / ■	■ / ■	■ / ■	□ / □	□ / □
NEC	Miniscribe	Maxtor	CDC	Microscience	NEC	IBM
100MB	150MB	642MB	120MB	107MB	135MB	120MB
ESDI	ESDI	ESDI	RLI	ESDI	ESDI	SCSI
Card	Card	Card	Card	Card	Card	Motherboard
Adaptec	Western Digital	Western Digital	Western Digital	Western Digital	Western Digital	IBM
□	□	□	□	□	□	□
2 half-height, 2 3.5-inch	2 half-height, 2 3.5-inch	1 full-height, 4 half-height	3 3.5-inch	2 half-height, 2 3.5-inch	2 full-height, 5 half-height	3 3.5-inch
60MB (ESDI)	40MB, 80MB, 170MB, 440MB (SCSI)	70MB, 150MB, 330MB (SCSI)	80MB, 200MB, 320MB (SCSI)	40MB, 70MB, 170MB (ESDI)	300MB (ESDI)	60MB (SCSI)

CONTINUES

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ful enough to run your whole
company, with software designed
for your kind of business.*





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You can buy an AS/400 Model C04 for \$18,250, which covers not just the computer, but operating system software and the relational data base. The cost of application software, terminals and printers, of course, depends on your needs and is not included.

To learn more about the AS/400 Model C04, see an IBM marketing rep, or call us at 1 800 365-4 IBM.

It's the affordable system for companies who can't afford to think small.



COVER STORY

MCA COMPUTERS



SUMMARY OF FEATURES: MCA COMPUTERS

Products listed in ascending price order



NCR Workstation
Products Division
NCR
PC386sx/MC₂₀

Apricot in
Canada Inc.
Apricot QI
300-80

Reply Corp.
Reply 386SX/20

Wang
Laboratories Inc.
Wang MC 350/16S

IBM Corp.
IBM PS/2
Model 65SX

FLOPPY DISK DRIVES

Type	1.44MB	1.44MB	1.2MB, 1.44MB	1.44MB	1.44MB
Manufacturer	TEAC	Sony	TEAC	Mitsubishi	Mitsubishi

EXPANSION BUS

Bus speeds (MHz)	10	10	10	10	10
Expansion slots	Four 16-bit (one with 8514 extension)	Four 16-bit (one with 8514 extension)	Five 16-bit (one with 8514 extension)	Five 16-bit	Eight 16-bit
Slots left free after hard and floppy disk drives, video, one parallel and two serial ports are installed	4	3	5	3	6
Ports originate on motherboard	■	■	■	■	■

VIDEO

Display circuitry location	Motherboard	Motherboard	Motherboard	Motherboard	Motherboard, card (optional)
Interface	16-bit	16-bit	16-bit	16-bit	16-bit
Manufacturer	NCR	Apricot	Reply	Wang	IBM
Chip set manufacturer	NCR	Chips and Technologies	Chips and Technologies	Chips and Technologies	IBM

KEYBOARD AND MOUSE

Keyboard:					
Manufacturer	Cherry	Apricot	Reply	Honeywell	IBM
Number of keys	101	101	101	101	101
Function keys	12	12	12	12	12
Cable length (inches)	72	75	72	60	98
Mouse port	□	■	■	■	■

SOFTWARE

DOS	4.01 (\$150)	4.01 (included)	4.01 (\$145)	3.3 (\$100), 4.01 (\$150)	4.01 (\$150)
OS/2	1.1 (\$340)	1.2 (\$295)	1.2 (\$295), Extended Edition 1.2 (\$795)	1.1 (\$340)	Extended Edition 1.2 (\$830)
Disk caching software	None	None	None	None	None
Expanded memory manager	None	None	Reply 1.0 (included)	MCEMM.SYS (included)	None

MISCELLANEOUS

Coprocessor supported	80387SX	80387/16	80387SX	80387SX	80387SX/16
Physical features:					
Power supply (watts)	175	145	200	111	250
Dual voltage	■	■	■	■	■
Number of device connectors	5	3	5	3	2
Keyboard lock	None	None	None	None	Side
Case lock	Front	Back	Back	Back	Side
Power-on switch	Front	Side	Front	Front	Front
Reset switch	None	None	Front	None	None
Warranty	1 year	1 year	1 year	1 year	1 year
Service	On-site	Return to dealer or manufacturer; on-site optional	On-site	Return to sales office or service center	Return to dealer or manufacturer
FCC certification class	B	A	B	B	A

■—Editor's Choice ■—Yes □—No

COVER STORY

MCA COMPUTERS



American Mitac
Corp.
Mitac MPS3000F

Tandy Corp.
Tandy 5000 MC

Advanced Logic
Research Inc.
ALR MicroFlex
3300

Apricot in
Canada Inc.
Apricot Qi PCI

Memorex Telex
Corp.
Memorex Telex
Intelligent
7270 Workstation

Olivetti Office
USA
Olivetti P800

IBM Corp.
IBM PS/2
Model 70-A21

1.44MB
Alps

1.44MB
TEAC

1.44MB
Toshiba

1.44MB
Sony

1.2MB, 1.44MB
Panasonic, TEAC

1.44MB
NEC

1.44MB
Alps

10
Four 16-bit,
two 32-bit

10
Three 16-bit,
two 32-bit
proprietary

10
Four 16-bit,
three 32-bit

10
Two 16-bit,
two 32-bit

10
Four 16-bit,
two 32-bit

8
Five 16-bit,
three 32-bit

10
One 16-bit,
two 32-bit

4

3

4

3

4

7

3

■

■

■

■

■

■

■

Motherboard

Motherboard

Card

Motherboard

Motherboard

Motherboard

Motherboard

16-bit
Mitac
Chips and
Technologies

8-bit
Tandy
Intel

16-bit
ALR
Chips and
Technologies

16-bit
Apricot
Chips and
Technologies

16-bit
Mitac
Chips and
Technologies

16-bit
Olivetti
Chips and
Technologies

16-bit
IBM
IBM

Chicony
101
12
83
■

Tandy/Fujitsu
101
12
60
■

Hi-Tek
101
12
100
■

Apricot
101
12
75
■

Hitec
101 or 102
12
93
■

Olivetti
101
12
100
■

IBM
101
12
98
■

4.01 (included)

3.3 (\$100),
4.01 (\$140)

4.01 (\$150)

4.01 (included)

4.01 (\$130)

4.01 (included)

4.01 (\$150)

None

1.0 (\$325)

None

1.2 (\$295)

1.1 (\$325)

1.1 (\$340)

Extended
Edition 1.2
(\$830)

None
Mitac MEMS
(included)

None
None

None
None

None
None

None
None

None
QEMM-386
(included)

None
None

80387,
Weitek 3167

80387

80387,
Weitek 3167

80387/25

80387,
Weitek 3167

80387/25,
Weitek 3167

80387/16,
-/20, -/25

150

200

200

145

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Back

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Front

None

Back

None

Back

Back

Front

Front

Top

Side

Front

Front

Front

Front

Front

None

None

Front

Front

None

1 year

1 year

1 year

1 year

1 year

1 year

1 year

On-site

Return to dealer

Return to dealer

Return to
dealer or
manufacturer;
on-site
optional

On-site (90
days), then
return to
manufacturer

Return to dealer

Return to
dealer or
manufacturer

B

A

A

A

B

B

B

ENDS

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CIRCLE 157 ON READER SERVICE CARD

NEC



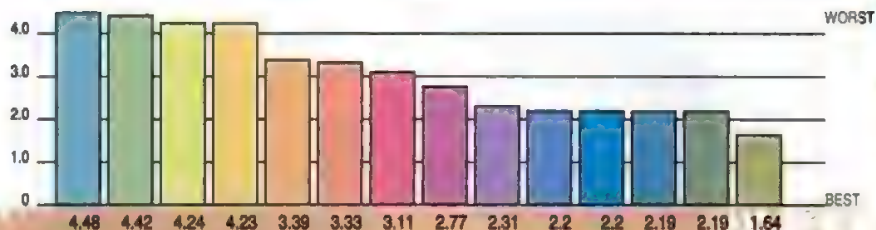
BENCHMARK TESTS: MCA COMPUTERS

Our tests continue to prove there is just no substitute for processor speed and processor RAM caching. The ALR MicroFlex 3300, a 33-MHz 386 machine, places among the top two on every test but the BIOS Disk Seek. Compared with similarly configured ISA-bus machines we have reviewed in the past, these systems are among the fastest.

80386 Instruction Mix

Elapsed Time (seconds)

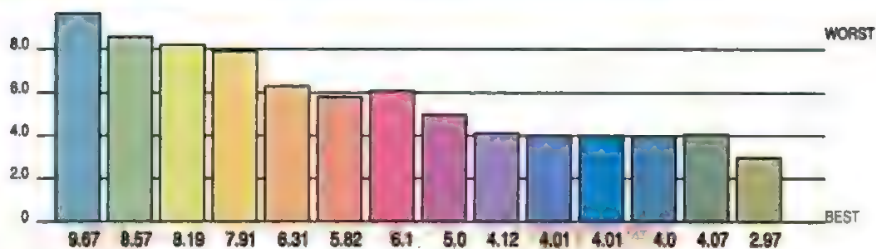
The 80386 Instruction Mix benchmark test times a series of tasks specific to the 80386 chip. Since this test shows how the CPU operates in the context of the bus, processor, system memory, and motherboard architecture, a faster time means better overall computer performance.



Floating-Point Calculation Without Coprocessor

Elapsed Time (seconds)

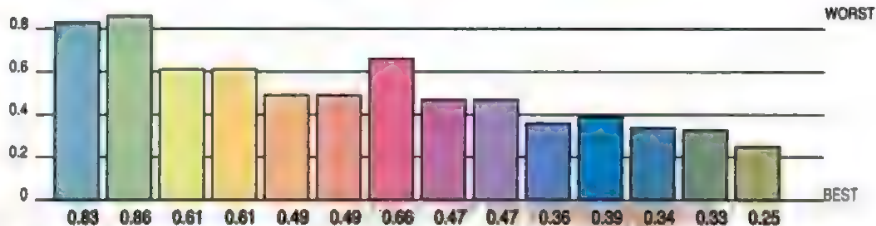
The Floating-Point Calculation Without Coprocessor benchmark test sets up a floating-point emulation program in RAM and then exercises the processor and tests RAM access speeds during floating-point calculations.



Conventional Memory

Elapsed Time (seconds)

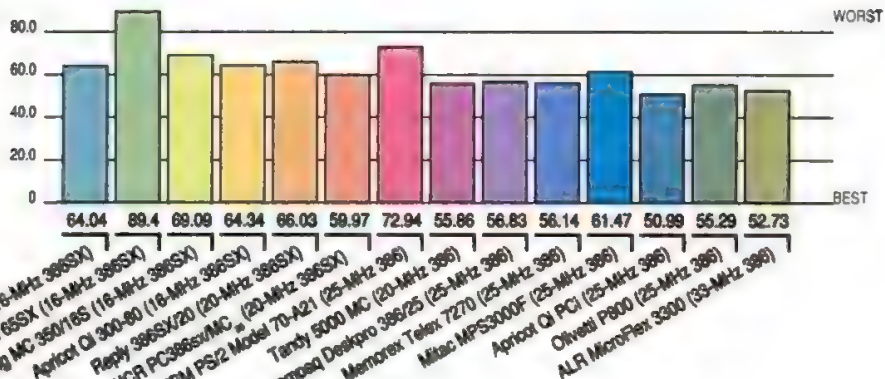
The Conventional Memory benchmark test measures the read/write speed of the first 640K of memory. Slower relative times can indicate the presence of memory wait states or memory chips rated at slower access speeds.



DOS File Access (Small Records)

Elapsed Time (seconds)

The DOS File Access (Small Records) benchmark test times disk throughput as a result of mechanical disk drive speed, hard disk controller function, and bus speed. The test is performed without software disk caching. Fast times are advantageous for programs that work with many short segments of data.

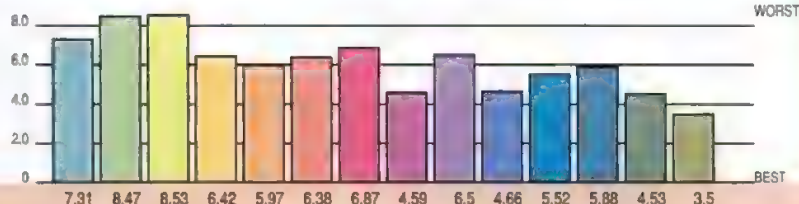


* Reported for comparison.

DOS File Access (Large Records)

Elapsed Time (seconds)

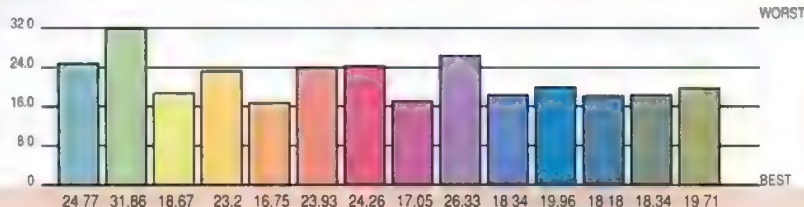
The **DOS File Access (Large Records)** benchmark test times disk throughput as a result of mechanical disk drive speed, hard disk controller function, and bus speed. This test minimizes the effect of small hardware caches on disk subsystem performance. It is performed without software disk caching.



BIOS Disk Seek

Elapsed Time (milliseconds)

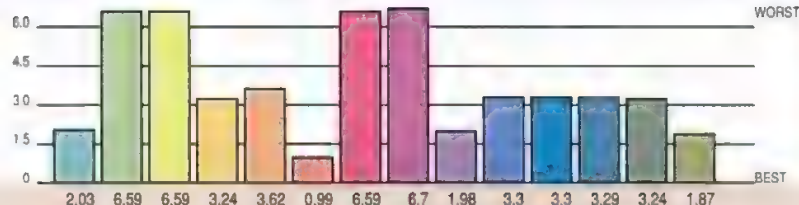
The **BIOS Disk Seek** benchmark test measures mechanical track-to-track disk drive access times. Fast times are helpful with programs such as databases, which often store and must later find data in many separate places on a drive.



Direct to Screen

Elapsed Time (seconds)

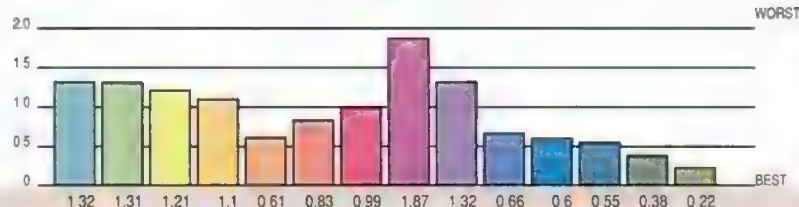
The **Direct to Screen** benchmark test indicates the speed of the video adapter memory. Good scores indicate that information can get to the screen quickly, particularly for programs that avoid the computer's BIOS and go directly to the screen.



Video BIOS Routine Without Scrolling

Elapsed Time (seconds)

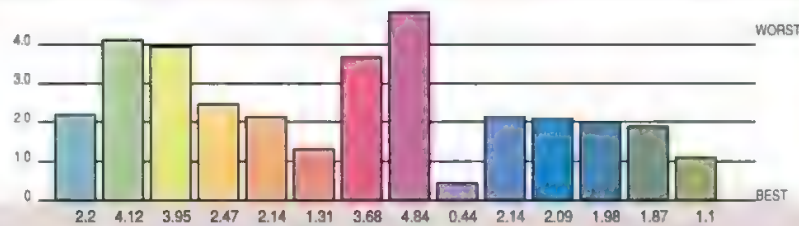
The **Video BIOS Routine Without Scrolling** benchmark test measures how quickly the BIOS on the video adapter writes text data to the screen. Fast video writing helps with programs that show full or partial screens of data without scrolling the screen.



Video BIOS Routine with Scrolling

Elapsed Time (seconds)

The **Video BIOS Routine with Scrolling** benchmark test measures how fast the video adapter can scroll the screen, moving the display up one line at a time. Good performance is helpful for scrolling through word processing or spreadsheet files.



*Compaq Deskpro 386S (16-MHz 386SX)
IBM PS/2 Model 65SX (16-MHz 386SX)
Wang MC 350-16S (16-MHz 386SX)
Apricot Qi 300-80 (16-MHz 386SX)
Reply 386SX-20 (20-MHz 386SX)
NCR PC386sx MC (20-MHz 386SX)
IBM PS/2 Model 70-A21 (25-MHz 386)
Tandy 5000 MC (20-MHz 386)
*Compaq Deskpro 386-25 (25-MHz 386)
Memorex Telex 7270 (25-MHz 386)
Milac MPS3000F (25-MHz 386)
Apricot Qi PCi (25-MHz 386)
Olivetti P800 (25-MHz 386)
ALR MicroFlex 3300 (33-MHz 386)

CONTINUES



PROCESSOR, MEMORY, AND DISK BENCHMARK TESTS: COMPOSITE VIEW

PC Labs tested 12 MCA computers ranging from 16-MHz 386SXs to a 33-MHz 386. The scores for the Compaq Deskpro 386S and Compaq Deskpro 386/25 are also reported for comparison. We performed all the tests with buffers set at their defaults and the system and video BIOS enabled.

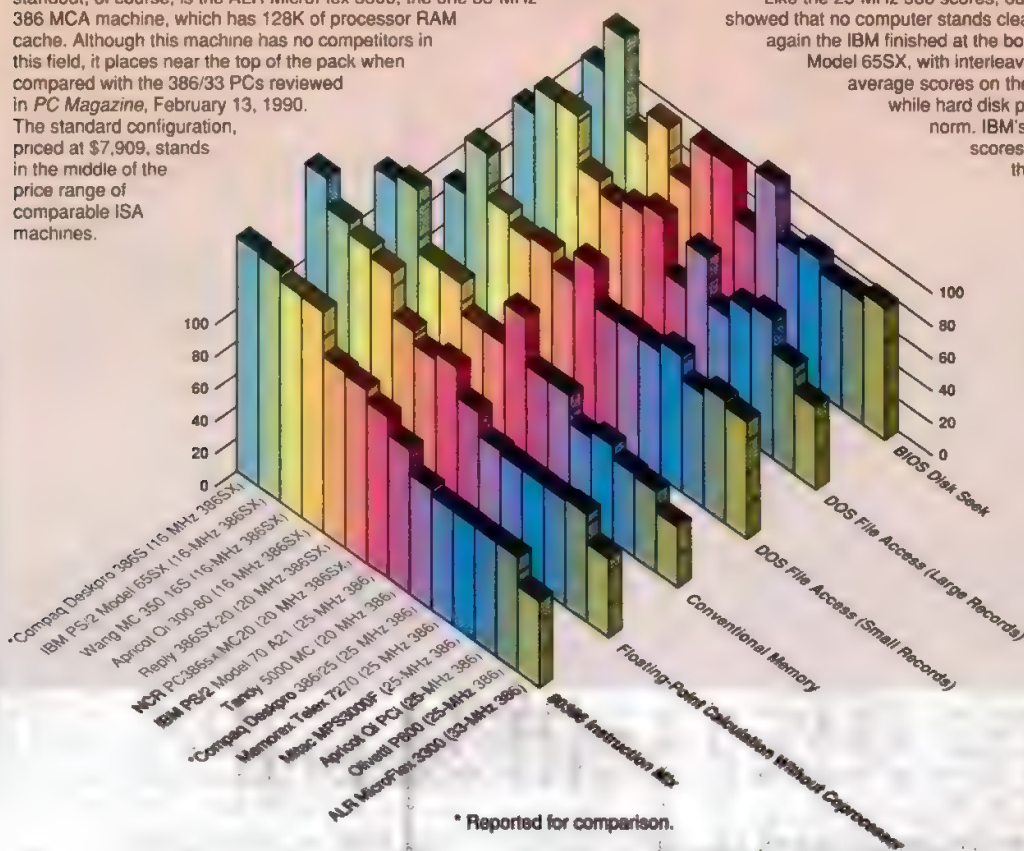
Since there are so few machines with each type of processor, comparing test results is difficult. But we can look back to previous issues of *PC Magazine* for additional data.

Most of these machines compare favorably with the best of the ISA machines we have tested previously. While we still cannot make any sweeping generalizations about MCA versus ISA, the scores show us that the MCA clone makers have concentrated on performance. The standout, of course, is the ALR MicroFlex 3300, the one 33-MHz 386 MCA machine, which has 128K of processor RAM cache. Although this machine has no competitors in this field, it places near the top of the pack when compared with the 386/33 PCs reviewed in *PC Magazine*, February 13, 1990. The standard configuration, priced at \$7,909, stands in the middle of the price range of comparable ISA machines.

Among the 25-MHz 386s, all of the machines except the IBM PS/2 Model 70-A21 compare respectably with the 386/25 computers reviewed in *PC Magazine*, July 1990. Still, the Mitac MPS3000F's disk scores are less impressive than the 19-millisecond average access time for the NEC 100MB ESDI hard disk would suggest.

The performance of the IBM PS/2 Model 70-A21, a 25-MHz 386, reflects IBM's conservative stance on computing. Although it may be an industry standard, the Model 70-A21 barely surpassed the processor speed of the Reply 386SX/20, fell behind the floating-point performance of the NCR PC386sx/MC₂₀, and was topped on both processor tests by the Tandy 5000 MC, a 20-MHz 386. Its performance was more on a par with the 16-MHz 386SXs on the memory and disk tests.

Like the 25-MHz 386 scores, our 16-MHz machines' test results showed that no computer stands clearly above the others—although again the IBM finished at the bottom of the pack. The IBM PS/2 Model 65SX, with interleaved memory, received below-average scores on the processor and memory tests, while hard disk performance fell far below the norm. IBM's 120MB SCSI hard disk turned in scores that were surprisingly close to the bottom even when compared with the inexpensive 386SXs reviewed in *PC Magazine*, August 1990.



CONTINUES

slots plus one 16-bit slot with an 8514 extension.

A Chips and Technologies Super VGA chip set comes with the system, although the monitor is a plain-vanilla VGA unit. This chip set, the 32K cache, and Intel's 82385 cache controller are all on the motherboard, along with the floppy disk drive controller and I/O and mouse ports. This explains why five of the six slots on the tested unit were empty, leaving plenty of room for growth. The sixth slot was filled with a Western Digital ESDI controller card.

On PC Labs' processor and memory tests, the Memorex Telex 7270 turned in much the same level of performance as the other 25-MHz 386 systems, even those with a 64K cache. Performance on the disk and video tests was on the low side of average but not slow enough to become an issue. Most important, the system passed our compatibility tests without any problems.

EMPHASIS ON SERVICE

Part of what makes the Memorex Telex 7270 worth considering is the company's

generous support policy. In an unusual approach to warranty service, the vendor has included in the system price your choice of either 90-day on-site service from Memorex or one year of carry-in service. For a meager \$35 premium, you can opt for a warranty covering a full year of on-site service.

The company also has an 800 number for technical support, which is available 12 hours each business day. If you have on-site service and you run into a problem that you can't resolve over the phone, the customer support department will

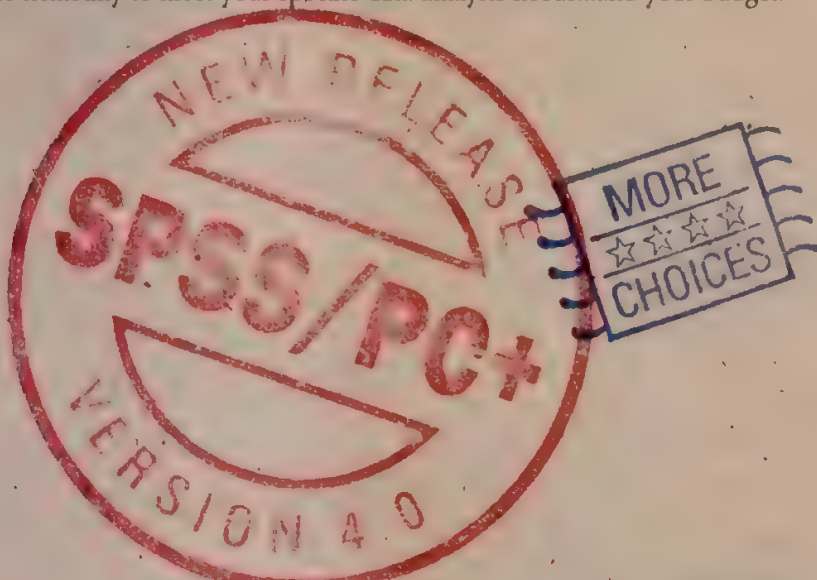
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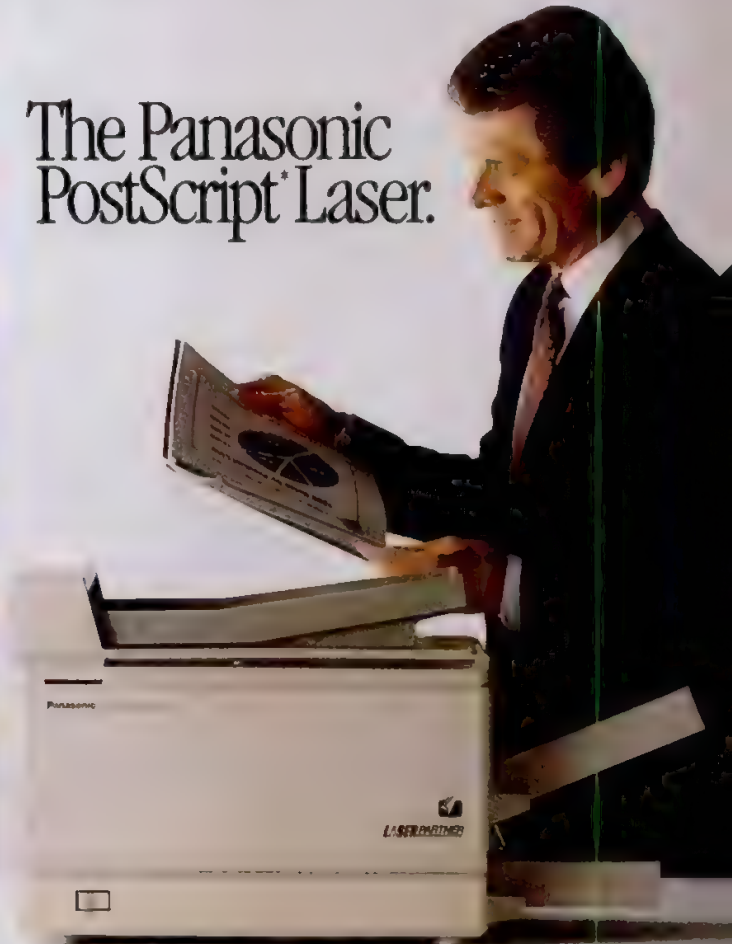
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RAM: 2MB Standard, expandable to 4MB.

Interfaces: RS-232C/422A Serial, Centronics Parallel and Appletalk.*



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Printing Speed: 11 pages per minute.**

Compatibility: HP LaserJet Series II, Panasonic, Epson, IBM and Diablo emulations.*

Fonts: 28 Internal Fonts-14 available in both portrait and landscape. Two slots for optional font cards.

Paper Handling: Two 250-Sheet Cassettes with Manual Feed.

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RAM: 512K Standard, expandable to 4.5MB.

Interfaces: Centronics Parallel and RS-232C Serial.



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Compatibility: HP LaserJet Series II emulation.*

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Paper Handling: 250-Sheet Cassette with Manual Feed. Face-up and face-down output.

Resolution: 300 Dots Per Inch.

RAM: 512K Standard, expandable to 4.5MB.

Interfaces: Centronics Parallel; Optional RS-232C Serial.

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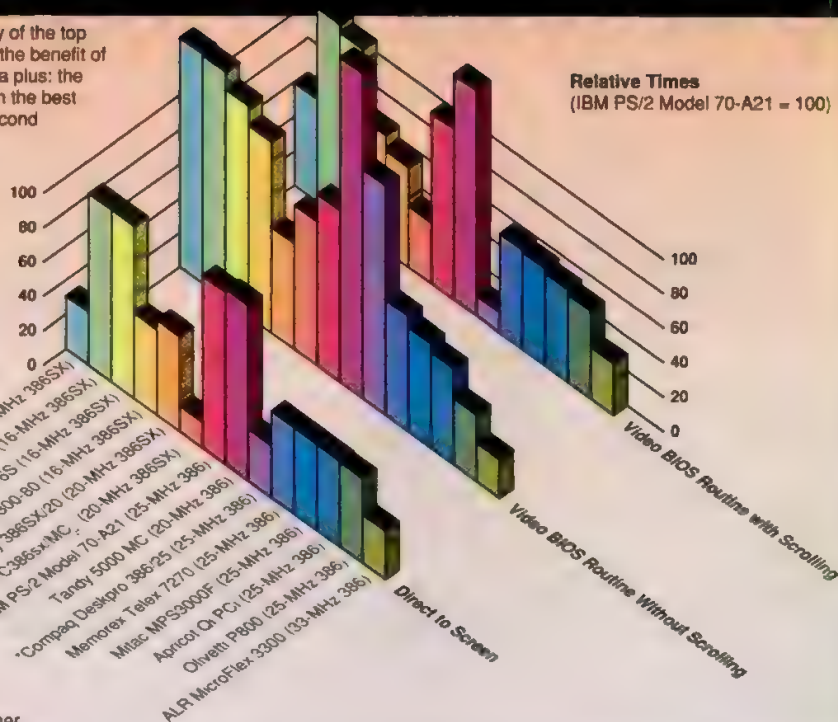


Among the machines tested in this issue, many of the top performers on the video tests excelled without the benefit of video shadowing. But shadowing could still be a plus: the

ALR MicroFlex 3300's video shadowing helped it turn in the best scores on both Video BIOS Routine tests and place second on the Direct to Screen test. The only machine that managed to best its 1.87-second score on that test was the NCR PC386sx/MC₂₀, which also had shadowing, and which chalked up a score of 0.99 seconds. This Super VGA machine also performed well on the Video BIOS tests, showing that NCR has really paid attention to video design on this unit.

The Olivetti P800 and the Apricot Qi PCi prove that among 386/25 machines, you don't need shadowing to have a video winner. Even without video shadowing, these systems managed to edge out the Mitac MPS3000F and the Memorex Telex 7270 Intelligent Workstation, both of which had shadowing enabled. The Apricot Qi 300-80, also without shadowing, turned in good performance in the 16-MHz SX class, with Video BIOS scores comparable to those of the Compaq Deskpro 386S, a reference machine known for its swift video performance.

As on the processor, memory, and disk benchmark tests, both IBMs failed to distinguish themselves on the video tests. These units, without shadowing, fared worse than any machines with comparable processors except the last-place Tandy 5000 MC. The Tandy's scores, in turn, were crippled by the use of an 8-bit rather than 16-bit video card.



* Reported for comparison.

ENDS

immediately order a service call. Memorex promises a response within 4 business hours for the vast majority of the United States, and next-day service for the rest of the country. This level of support is clearly a plus if you don't want to do your own troubleshooting and repair. Once the unit is out of warranty, you can extend the service contract if you like.

COMPLETE SOLUTION

Possibly more important than support issues is the company's determination to provide a complete solution for 3270 and LAN connectivity needs. Memorex Telex started out in the 3270 market and backed into personal computers because its terminal customers were looking for PC-based terminal emulation. The company's response was to zero in on the connectivity market and add LANs to the array of solutions.

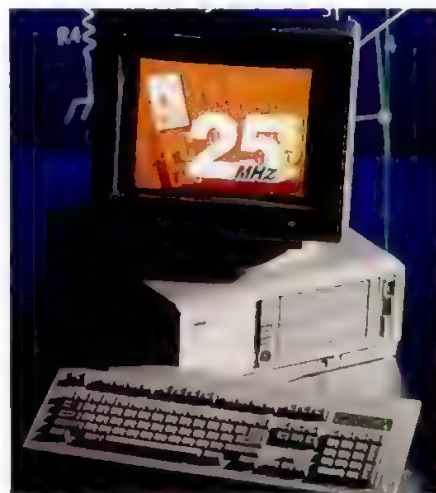
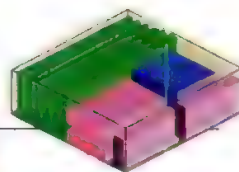
Today, according to Memorex Telex, the direct sales force operates almost as a consulting team, custom-designing solutions for network users. If the solution involves peripheral or LAN options that Memorex does not normally handle, the company will obtain the hardware anyway. And the company will also supply on-site support through its usual channels.

Judged strictly by the price of the hardware, the Memorex Telex 7270 Intelligent Workstation is no match for its American Mitac counterpart. But if you really need responsive support and are willing to pay for it, you may decide that the Memorex Telex 7270 is worth the premium price.

Mitac
MPS3000F

AMERICAN MITAC
CORP.

by M. David Stone



American Mitac Corp.'s 25-MHz Mitac MPS3000F is a good choice for anyone who doesn't want to give up a lot of desktop real estate; the small-footprint

FACT FILE

Memorex Telex 7270 Intelligent Workstation

Memorex Telex Corp., 6929 N. Lakewood Ave., Tulsa, OK 74117; (800) 950-3465.
List Price: With 4MB RAM, 32K processor RAM cache, 1.44MB 3.5-inch floppy disk drive, VGA support on motherboard (no monitor), one parallel and one serial port, mouse port, \$6,495; with 100MB hard disk, VGA monitor, DOS 4.01, \$9,790; with 1.2MB 5.25-inch floppy disk drive, \$10,035.
In Short: The Memorex Telex 7270 Intelligent Workstation is somewhat pricey, especially compared with the nearly identical Mitac offering. But for those who need it, the price buys a considerable level of support.

CIRCLE 607 ON READER SERVICE CARD



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DESQview is a multitask, multi-window environment for PCs and PS/2s. You can open several programs simultaneously! All your software will run under DESQview. Included is an AutoDialer, which memorizes your keystrokes, a DOS menuing system, and API for programmers who want to design their own multitask programs. **\$69.**

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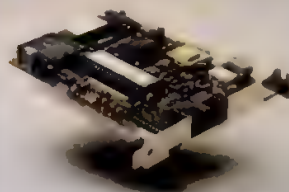
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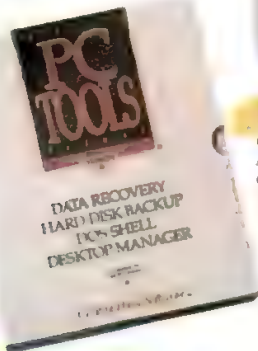
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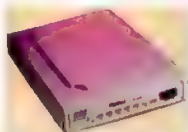
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PERFORMANCE TESTS: MCA COMPUTERS

Our performance tests show that both MCA system vendors and add-on board manufacturers are succeeding in making their equipment more compatible with each other.

Until recently, owners of MCA clones complained about the lack of compatibility between the available add-on boards and the PCs themselves. Their complaints were valid: it was often impossible to get the various MCA vendors' configuration utilities to load the adapter description files (ADFs) that accompanied certain third-party boards. Even when it was possible, the boards did not always function properly.

That's why when we decided to review MCA machines, we knew it would be important to include our own compatibility tests. We knew it wouldn't be enough to tell

you whether we could install the boards in the machines correctly or not; to get at the truth, we had to put the equipment to use in real-world applications.

We chose add-in products from major LAN, tape-backup, and fax-board vendors, who generally have the facilities to test their products on a variety of MCA systems. This helped to insure that any compatibility problems that occurred would lie with the machines themselves, rather than with the files supplied by the add-in board manufacturers.

The results of our tests should be

welcomed by the many MCA users who formerly had cause to complain. The only two machines that failed any of the tests were the Tandy 5000 MC and the Wang MC 350/16S. Both were unable to load the ADF for the tape backup unit, preventing us from performing either tape backup test using them.

Overall, it seems as if clone vendors are working to make their machines conform better than ever to IBM's MCA spec, while add-in board manufacturers are doing a better job of testing and correcting bugs found in their ADFs.

machine measures just 6.25 by 14.75 by 16.5 inches. In fact, this system deserves to be considered by most users: no cut corners, no oversights, and no questionable design choices mar its performance.

Priced at \$6,875, the test unit came with *PC Magazine's* standard configuration: 4MB of RAM, a 23-millisecond 100MB NEC hard disk, a 3.5-inch high-density floppy disk drive, a Tatung VGA monitor bearing a Mitac label, and DOS 4.01. The base price of \$4,995 includes only 1MB of RAM and leaves out the hard disk and monitor, but is otherwise identical to the tested configuration. Both prices include a one-year on-site warranty, with service provided by Bell Atlantic Business Systems Services.

As is typical of small-footprint systems, on the front panel you'll find the

power and reset switches as well as the keyboard lock. Inside the box is Mitac's own motherboard with an Intel chip set, a Phoenix BIOS, and a coprocessor socket for either an 80387 or a Weitek 3167. Also on the motherboard are four 1MB SIP chips, plus four empty SIP connectors. If you need more than 8MB of RAM, you'll have to add a memory board (two 32-bit slots are available). While Mitac does not sell such boards itself, the company says the system will work with any third-party board designed for the MCA bus.

**Perhaps the best
compliment for the
American Mitac is that
it behaves just the
way it should.**

The motherboard also has 32K of 25-nanosecond cache, handled through an Intel 82385 cache controller; this is both the minimum and maximum available for the system. PC Labs' benchmark tests suggest that 32K is sufficient, since the unit's performance on processor and memory tests is on a par with the other 25-MHz 386 MCA systems we tested, including machines with a 64K cache.

The floppy disk controller and the parallel, serial, mouse, and video ports are all on the motherboard. Interestingly, Mitac says that the motherboard's Chips

and Technologies video chip set offers Super VGA resolution, although only a VGA monitor was provided for review.

Of course, the key features on an MCA motherboard are the MCA slots. In addition to two 32-bit slots, the MPS3000F offers three standard 16-bit slots and one 16-bit slot with the 8514 extension. On the review unit, only one slot was filled—with an Adaptec ESDI controller—leaving plenty free for expansion.

A NICE FIT

The bay arrangement on the MPS3000F manages to offer more storage space than you might expect from a small-footprint system. On the front of the chassis are two horizontal half-height 5.25-inch bays plus one vertical 3.5-inch bay on the extreme right. A second 3.5-inch bay for the hard disk is tucked away at the back of the system, directly in line with the front bay. The power supply is positioned slightly to the left, but not far enough over to interfere with the slot arrangement. The result looks as if you'd need a shoehorn to fit everything in, but it all fits quite nicely.

Beyond its good performance on our memory and processor tests, the MPS3000F was also on a par with other 25-MHz systems on PC Labs' disk and video benchmark tests. More important, it passed all our compatibility tests.

Perhaps the best compliment for the Mitac MPS3000F is that it behaves just the way it should. If you want a 386/25 with an MCA bus and you like the idea of a small-footprint design, the Mitac is a sensible choice.



FACT FILE

Mitac MPS3000F

American Mitac Corp., 410 E. Plumeria Dr., San Jose, CA 95134; (800) 648-2287, (408) 432-1160.

List Price: With 1MB RAM, 32K processor RAM cache, 1.44MB 3.5-inch floppy disk drive, VGA support on motherboard (no monitor), one parallel and one serial port, mouse port, DOS 4.01, \$4,995; with 4MB RAM, 100MB hard disk, VGA monitor, \$6,875.

In Short: The Mitac MPS3000F offers 386-25 performance, a small-footprint design, and one more drive bay than you might expect. The system delivers just what it promises and is well worth a look.

CIRCLE 608 ON READER SERVICE CARD

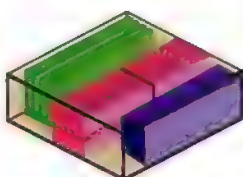
Local Area Network Tests. On each MCA machine, we installed IBM's 16/4 Adapter/A, a Token-Ring adapter running at 4 megabits per second, and then attempted to log on to a local area network using Novell's *Advanced NetWare 286*, Version 2.15. If the attempt was successful, the machine passed the **Log-on** test. We then transferred a file from the local hard disk to the network server. If we were able to access the file, uncorrupted and in perfect condition, the machine passed the **File Transfer** test.

Tape Backup Tests. We installed a 2.2-gigabyte tape backup unit, The VAST Device from Emerald Systems Corp., on each system. We then backed up a file to that unit; if the operation proceeded without any problems, the computer passed the **Backup** test. Next we deleted the same file from the hard disk and restored the original file to the machine from the tape backup unit. If the file was uncorrupted when we accessed it again, the machine passed the **Restore** test.

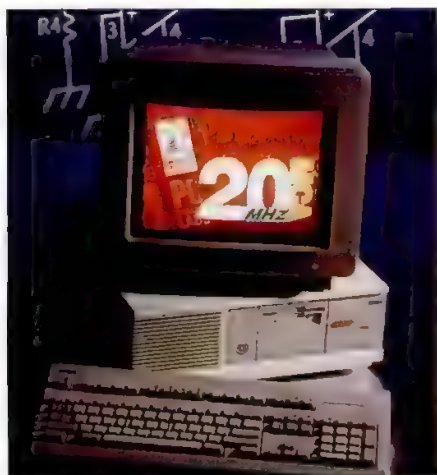
Fax Board Tests. We installed an MCA board, the GammaFax CP from GammaLink, in each PC. We then sent a fax from the PC to a fax machine at the *PC Magazine* offices. If the transmission went well, the machine passed the **Send** test. We also sent a fax from our fax machine to the GammaLink board; if the transmission was successful, the system passed the **Receive** test.

	LOCAL AREA NETWORK TESTS		TAPE BACKUP TESTS		FAX BOARD TESTS	
	Log-on	File Transfer	Backup	Restore	Send	Receive
ALR MicroFlex 3300 (33-MHz 386)	P	P	P	P	P	P
Apricot Qi 300-80 (16-MHz SX)	P	P	P	P	P	P
Apricot Qi PCi (25-MHz 386)	P	P	P	P	P	P
IBM PS/2 Model 65SX (16-MHz SX)	P	P	P	P	P	P
IBM PS/2 Model 70-A21 (25-MHz 386)	P	P	P	P	P	P
Memorex Telex 7270 Intelligent Workstation (25-MHz 386)	P	P	P	P	P	P
Mitac MPS3000F (25-MHz 386)	P	P	P	P	P	P
NCR PC386sx/MC ₂₀ (20-MHz SX)	P	P	P	P	P	P
Olivetti P800 (25-MHz 386)	P	P	P	P	P	P
Reply 386SX/20 (20-MHz SX)	P	P	P	P	P	P
Tandy 5000 MC (20-MHz 386)	P	P	F	F	P	P
Wang MC 350/16S (16-MHz SX)	P	P	F	F	P	P

NCR
PC386sx/
MC₂₀



NCR WORKSTATION
PRODUCTS DIVISION
by Bill O'Brien



The NCR PC386sx/MC₂₀ represents a near-milestone for a company whose PC

prices are usually more in line with machines from other major players like Compaq and IBM. In *PC Magazine's* standard configuration, including 2MB of RAM, a 44MB hard disk, 1.44MB 3.5-inch floppy disk, a VGA display, and DOS, this small-footprint system carries a \$4,844 price tag. It's actually priced to compete with comparably equipped machines sold by smaller or less well-known vendors.

Unfortunately, the price doesn't remain in the moderate category for long. While the above quote gives you a fully configured system that's ready to go, upgrade costs can be painful. NCR charges \$750 for each 2MB upgrade, and \$1,695 for a 100MB hard disk. The tested configuration, with 8MB of RAM and the 100MB disk, sells for \$7,794—nearly \$700 more than a similar offering from Reply Corp.

On the face of things, the PC386sx/MC₂₀ is a rather plain box, with the power switch and case lock found on the front. Two one-third-height drive bays also adorn the front of the enclosure; in the review machine, one bay was filled by a 3.5-inch high-density floppy disk drive. The front-facing drive bays are part of a



NCR PC386sx/MC₂₀

NCR Workstation Products Division, 1601 S. Main St., Dayton, OH 45479; (800) 544-3333. **List Price:** With 2MB RAM, 44MB hard disk, 1.44MB 3.5-inch floppy disk, VGA monitor, DOS 4.01, \$4,844; with 8MB RAM, 100MB hard disk, \$7,794.

In Short: The competitive pricing of the standard configuration of the NCR PC386sx/MC₂₀ makes it attractive as a workstation for either home or office. The cost of upgrade options can limit its appeal.

CIRCLE 600 ON READER SERVICE CARD

removable drive chassis that extends to the back of the machine. The rear section of the module contains an additional 3.5-inch bay, the mounting point for the hard disk. With the hard disk installed, there is room for only one more storage device.

The 100MB Conner hard disk is operated by a noncaching SCSI controller integrated onto the motherboard. The computer's disk is competitive with those on the other 20-MHz machines; PC Labs' benchmark test results show that while it runs slightly slower, it is still a good performer.

WHAT'S INSIDE

The platform for the computer is an NCR motherboard that heavily employs surface-mount technology. Intelligence comes from the combination of an Intel chip set and a Phoenix BIOS. Four MCA slots are included; all are available because the essential video, disk, parallel, and serial I/O functions are integrated into the motherboard. The power supply is a Teapo device custom-designed for NCR and fitting neatly along the left side of the chassis. It's rated at 175 watts and should be durable enough for any collection of boards.

The chips that make up the machine's standard complement of 2MB of RAM are soldered onto the motherboard, and initial memory expansion beyond that level is achieved via three SIMM slots tucked under the speaker bracket. The machine NCR sent for review had all three slots filled, bringing the total memory to the motherboard maximum of 8MB. All of the chips were high-speed 70-nanosecond devices running at zero wait states without processor RAM cache. If you need to install further memory, you'll have to sacrifice an expansion slot and use one of the currently available Micro Channel architecture-compatible add-in memory boards.

The integral video system uses an NCR chip set to produce 800 by 600 Super VGA output, and "super" is definitely the correct name to apply to it. PC Labs' video benchmark tests peg it as one of the fastest video systems in any reviewed machine, second in overall performance only to the 33-MHz ALR MicroFlex 3300. The NCR video system is 16-bit, and video shadowing is permanently on to assist in providing near-stellar performance.

CLAIM TO FAME

One of NCR's claims to fame, and the reason many users are willing to pay its higher prices, is its support. Its SX MCA machine comes with a full year of on-site service backed by the company. NCR's traditional customers—very often, large corporate bases—appreciate that level of service. They are also likely to appreciate the SX machine's upgrade options, and to be able to swallow the price for them. Other users with less money to burn, however, should be well pleased with the price of the PC386sx/MC₂₀ in its standard configuration. Provided they do not need the additional power the upgrades afford,

OWNER STORY MCA COMPUTERS

that version of this machine will make a reliable workstation for *Microsoft Windows*.

Olivetti P800

OLIVETTI
OFFICE USA
by Bruce Brown



The Olivetti P800 is a Micro Channel machine of considerable dimensions: its vertical case measures 22.5 by 8.5 by 27 inches (HWD). Its large size is well matched to its rather high price tag, and also to users who are interested in a file server for network and multiuser installations.

The standard-configuration price for this 25-MHz 80386 system is \$11,475, including 4MB RAM, an 18-millisecond 135MB NEC hard disk, a 1.44MB or 1.2MB floppy disk drive, an Olivetti VGA monitor, a 101-key keyboard, memory management software, and DOS 4.01. The same system with a 300MB hard disk—the only other disk option—costs an additional \$2,500.

The P800 uses Olivetti's own ROM BIOS and the common Chips and Technologies chip set on an Olivetti-made motherboard. Floppy disk drive controllers, VGA capabilities, I/O port circuitry, and a mouse port are all integrated onto the motherboard.

The motherboard can hold up to 8MB

of 80-nanosecond SIMMs. The system is able to handle a maximum of 40MB, and memory upgrades cost \$1,595 per 4MB module; while this cost is higher than current street prices, it's lower than IBM's asking price. The machine comes equipped with a 64K RAM cache that uses 25-ns. SRAM chips, and it can accommodate an Intel 80387/25 math coprocessor or a Weitek 3167 coprocessor or both.

A FORCEFUL PRESENCE

The P800's case is a monument to be reckoned with. The interface ports are on the top, covered by a metal panel. Each side panel comes off for access to the expansion slots or the bottom side of the motherboard. All these protective panels no doubt contribute to the system's FCC Class B rating.

Expansion room is admirable. The case can hold up to five half-height and two full-height drives. The optional \$625 600VAC American Power Conversion standby power supply (SPS) plugs into Olivetti's 295-watt power supply. The battery in the SPS will keep the system running for approximately 10 minutes after a power failure. With Olivetti's standby software implemented, the computer monitors the battery level once the SPS takes over; when the battery voltage reaches a certain level, the software automatically saves open files and shuts the system down.

Altogether, there are eight expansion slots: three 32-bit and five 16-bit. In the test machine, the only occupied slot held the Western Digital ESDI hard disk controller.

Olivetti computers are sold through computer dealers; therefore, you can probably negotiate a significant discount

FACT FILE

Olivetti P800

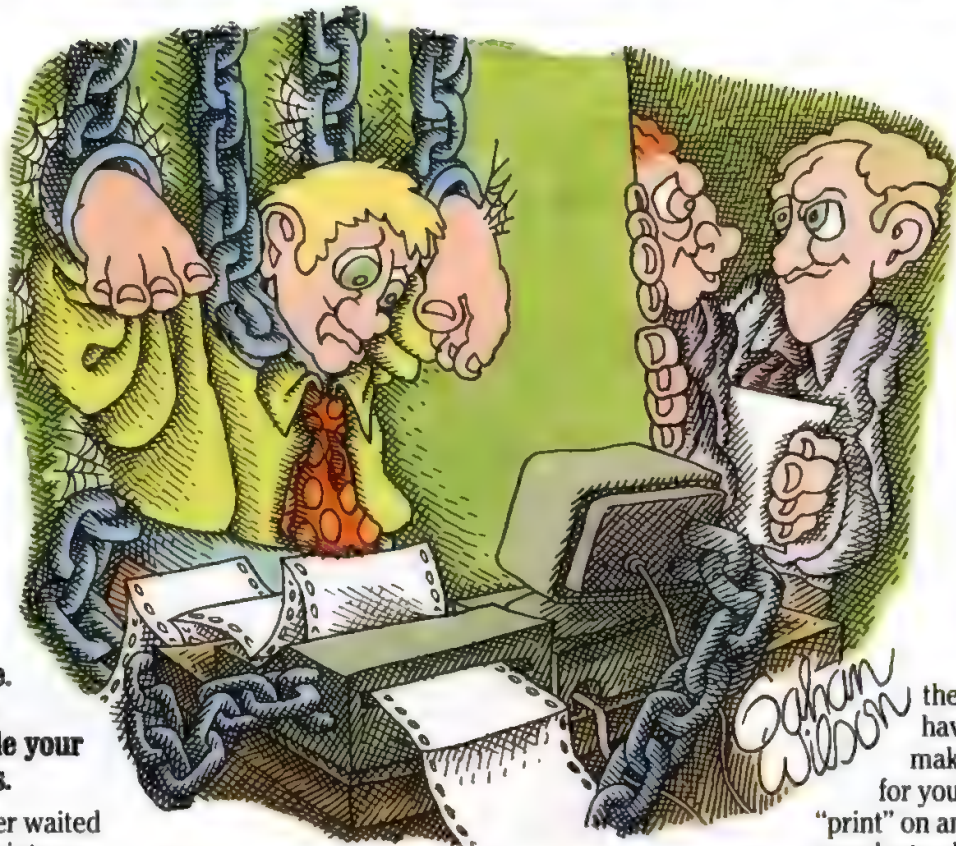
Olivetti Office USA, Office Products Division,
765 U.S. Highway 202 South, Bridgewater, NJ
08807; (201) 526-8200.

List Price: With 4MB RAM, 135MB hard disk,
1.44MB 3.5-inch floppy disk drive, 16-bit VGA
card, one parallel and one serial port, mouse
port, QEMM-386, \$10,575; with VGA monitor,
DOS 4.01, \$11,475.

In Short: The Olivetti P800 comes in a huge
vertical case. With its system maximum of
40MB RAM, a large power supply, and room
for plenty of drives, this 25-MHz 80386
machine is most appropriate for multiuser and
file-server applications.

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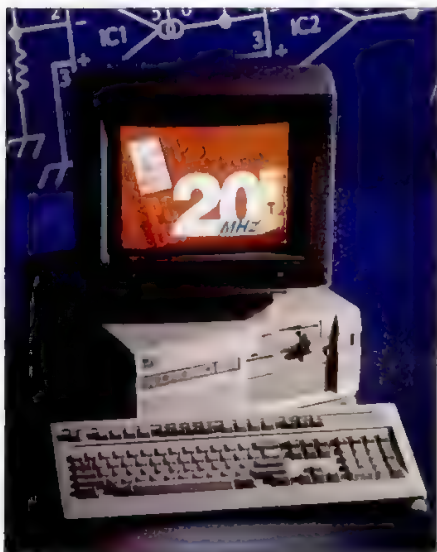
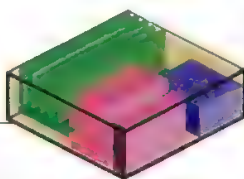
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for the P800. Your first line of support is the dealer itself, but you also have access to Olivetti's toll-free support line. If you call Olivetti and the staff determines that you need on-site service, the company will send someone out to your installation site.

The size (not to mention the price) of the Olivetti P800 obviously provides a clue to its intended use—as a heavy-duty network or multiuser file server in heavy-workload sites. If that description dovetails with your particular needs, you may want to consider putting this system on your list.

Reply 386SX/20

REPLY CORP.
by Bill O'Brien



Reply's MCA entry represents one of the new crop of turbo 386SX machines running at 20 MHz. The \$5,335 price for *PC Magazine's* standard configuration—2MB of RAM, a 60MB hard disk, 3.5-inch floppy disk drive, VGA color display, and DOS 4.01—is competitive among its peers. While the Reply 386SX/20 is no barn-burner in terms of performance, it is a steady contender from a company that does well in the support and service arena.

The tested configuration, with 8MB of RAM and a 120MB hard disk, costs \$7,105. Both the power switch and reset button are mounted on the front of the machine's case for easy access; no other controls are present on the face of the computer. Oddly enough, the case lock is located on the rear panel—which is trou-

blesome if you need to use it and your machine is up against the wall, but its location would be more bothersome if it were a keyboard lock.

Reply has carved out a 3.5-inch drive bay at the top edge of the front panel. This minor excavation allows you to install a 3.5-inch floppy disk drive without sacrificing either of the two half-height bays that are also included. Although the Reply 386SX/20 is a small-footprint machine measuring 5.5 by 14.2 by 16.5 inches, Reply has managed to mount an incredibly thin 3.5-inch IDE hard disk vertically along the right side of the chassis. In this configuration, a computer containing both hard and floppy disk drives still has two half-height bays available for expansion.

The drives and the 200-watt power supply occupy a third of the real estate from front to back along the right side of the chassis. Aside from this, you'll find vast areas of unused open space. The Reply 386SX/20 uses an active backplane with a 386SX processor board plugged into a proprietary slot. The backplane contains room for 8MB of SIMMs, five accessible 16-bit MCA slots, another dedicated MCA slot used solely for the cable that connects to the IDE controller, and all of the support chips needed to make the computer work. With the hard disk controller mounted on the disk itself, and the electronics for the 800 by 600 Super VGA video and parallel and serial ports originating on the motherboard, all five of the nondedicated 16-bit MCA slots remain vacant.

RESPONSIVE SUPPORT

During the review process, Reply instituted a revised ROM BIOS and asked us to retrofit the review machine to reflect the product it is currently selling. The attempted upgrade was a dismal failure. With the new ROMs installed, the computer refused to boot or show any sign of life. A call to Reply's technical support service got us on-line with a technician who diagnosed and solved the problem in less than a minute, and that's not as common a happening among computer vendors as you might like. The problem stemmed from the fact that with the new ROMs, a jumper on the processor board needed to be removed temporarily to clear the CMOS of existing ADF (adapter description file) MCA device-driver information. Once this was cleared, the jumper



FACT FILE

Reply 386SX/20

Reply Corp., 4435 Fortran Dr., San Jose, CA 95134; (800) 955-5295, (408) 942-4804.

List Price: With 2MB RAM, 60MB hard disk, VGA monitor, DOS 4.01, \$5,335; with 8MB RAM, 120MB hard disk, \$7,105.

In Short: Superb technical support, competent components, competitive pricing and performance, and an FCC Class B rating make this an MCA machine of choice for those who think of a computer as a tool and not an occupation.

CIRCLE 611 ON READER SERVICE CARD

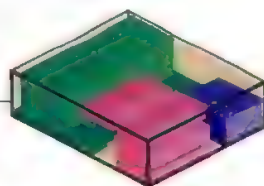
was replaced, the machine turned on, and all ADFs reinstalled.

While telephone support is Reply's first line of defense in maintaining its computers, it's not the only one. If your machine breaks down within the one-year warranty period, Reply will dispatch on-site service personnel to repair it. There's no extra cost for the service, nor are there any limits as to where the company will send its personnel.

The level of support you get, along with the machine's moderate pricing, competitive performance, and FCC Class B rating, make the Reply 386SX/20 capable of doing honorable duty in either the home or the office.

Tandy 5000 MC

TANDY CORP.
by Edward
Mendelson



The Tandy 5000 MC was the first non-IBM Micro Channel machine on the market. It should have been—but unfor-



FACT FILE

Tandy 5000 MC

Tandy Corp., 1800 One Tandy Center, Fort Worth, TX 76102; (817) 390-3011.

List Price: With 2MB RAM, 1.44MB 3.5-inch floppy disk drive, one parallel and one serial port, mouse port, \$3,999; with 4MB RAM, 150MB hard disk, VGA monitor, DOS 4.01, \$7,628; with VGA monitor, \$7,897.

In Short: Tandy's 20-MHz MCA entry has performance close to that of IBM's 20-MHz Model 70-121, but it failed one of PC Labs' compatibility tests. Five slots and two 5.25-inch drive bays give it more expansion room than the IBM.

CIRCLE 612 ON READER SERVICE CARD

unately isn't—the computer that IBM's PS/2 Model 70-121 also should have been but unfortunately isn't. Each computer gets the basic idea right but may lack the features to make it the machine you need.

Like its IBM counterpart, Tandy Corp.'s system runs its 80386 CPU at 20 MHz. Unlike IBM, which offers three expansion slots, Tandy supplies five. And also unlike IBM, Tandy's case has room for 5.25-inch devices, including a hard disk or an optional 1.2MB floppy disk drive.

Tandy got right the expandability that IBM's more compact machine got wrong. But the Tandy 5000 MC doesn't fulfill MCA's promise of switchless installation and tool-free expansion, and it was one of two machines that didn't pass all of PC Labs' compatibility tests (Wang's was the other). At \$7,628 for a system with 4MB of RAM, 32K of processor RAM cache, a 150MB ESDI hard disk, a 1.44MB floppy disk drive, a VGA monitor, and DOS 4.01, the 5000 MC is pricier than many other MCA computers, although you can get a stripped-down model with 2MB of RAM but no hard disk or monitor for \$3,999.

Except for upgrades to the Phoenix BIOS, the 5000 MC hasn't changed since its release in late 1988. The base-priced model has a motherboard with a built-in floppy disk drive controller, 8-bit VGA, and parallel, serial, and mouse ports. You also get a 101-key keyboard with a positive feel but a lighter touch than IBM's model. The total price of PC Labs' test machine, including a 16-bit \$430 Western Digital ESDI controller connected to a \$1,999 150MB MiniScribe hard disk, plus the \$629 VGM-300 VGA monitor, was \$7,897. When it released this ma-

chine, Tandy told *PC Magazine* that it was working on having the 5000 MC upgraded from an FCC Class A certification to Class B. Two years later, the computer is still certified Class A.

From the outside, the 5000 MC looks like a taller version of the IBM PS/2 Model 70, with more switches and more drive bays. Arrayed across the front are a reset switch, a keylock, and a power switch. At the front right are bays for two 3.5-inch devices, one filled with the 1.44MB floppy disk drive. Below these are bays for two exposed or hidden half-height 5.25-inch devices.

FIDDLING AROUND

While PS/2s and many other MCA machines can be simple to open, Tandy makes you unpack a screwdriver to get inside the 5000 MC's case. There you'll see an unusual layout consisting of a motherboard mounted with its video circuitry, ports, floppy disk drive controller, five expansion slots, 32K of cache RAM with an Intel 82385 cache controller, and quite a few jumper wires and traces. The 80386 and optional 80387 are plugged into a separate CPU card; the standard 2MB of RAM sits on a memory card in a 32-bit dedicated slot. A second dedicated slot can hold another memory card, which also has a maximum capacity of 2MB of RAM. On our tested unit, this slot held the second 2MB RAM board, which is a \$600 option.

Of the five MCA expansion slots, two are 32-bit and three are 16-bit. One of the latter has the video extension that IBM's 8514/A card uses.

You set up the 5000 MC with a reference disk that includes functions much like those on IBM's PS/2 reference disks. But unlike IBM, Tandy makes you fiddle with two sets of jumpers and 16 DIP switches if you want to add RAM using Tandy's proprietary memory cards. In PC Labs' compatibility tests, the machine worked successfully with all add-in boards except the Emerald City tape drive, which wouldn't install. The only other machine that failed this test was Wang Laboratories' MC 350/16S.

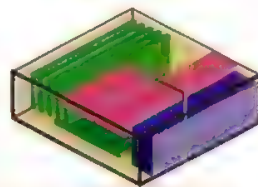
In PC Labs' benchmark tests, the 5000 MC performed among the better 20-MHz computers, although its video performance wasn't especially impressive. But in "*PC Magazine* Endurance Tests: 386s and Portables," (January 16, 1990), the

Tandy lost points for problems with its serial ports: The power-on self test reported a bad port when a serial port was linked to another computer by a cable, and the Tandy's expanded memory manager conflicted with the serial ports, resulting in time-out errors and other failures with file-transfer programs.

As for service, Tandy provides a one-year parts-and-labor warranty. If anything goes wrong with the system, you carry it back to the dealer (not too burdensome if it's your local Radio Shack Computer Center).

The 5000 MC doesn't offer the smooth compatibility and effortless installation that MCA promises. And if you compare it with classic-bus 20-MHz 386 machines, Tandy makes you pay a steep price for the still-questionable privilege of owning an MCA computer. The unit does offer more room for MCA expansion than its IBM counterpart does, but that's true of some better-designed systems as well.

Wang MC 350/ 16S



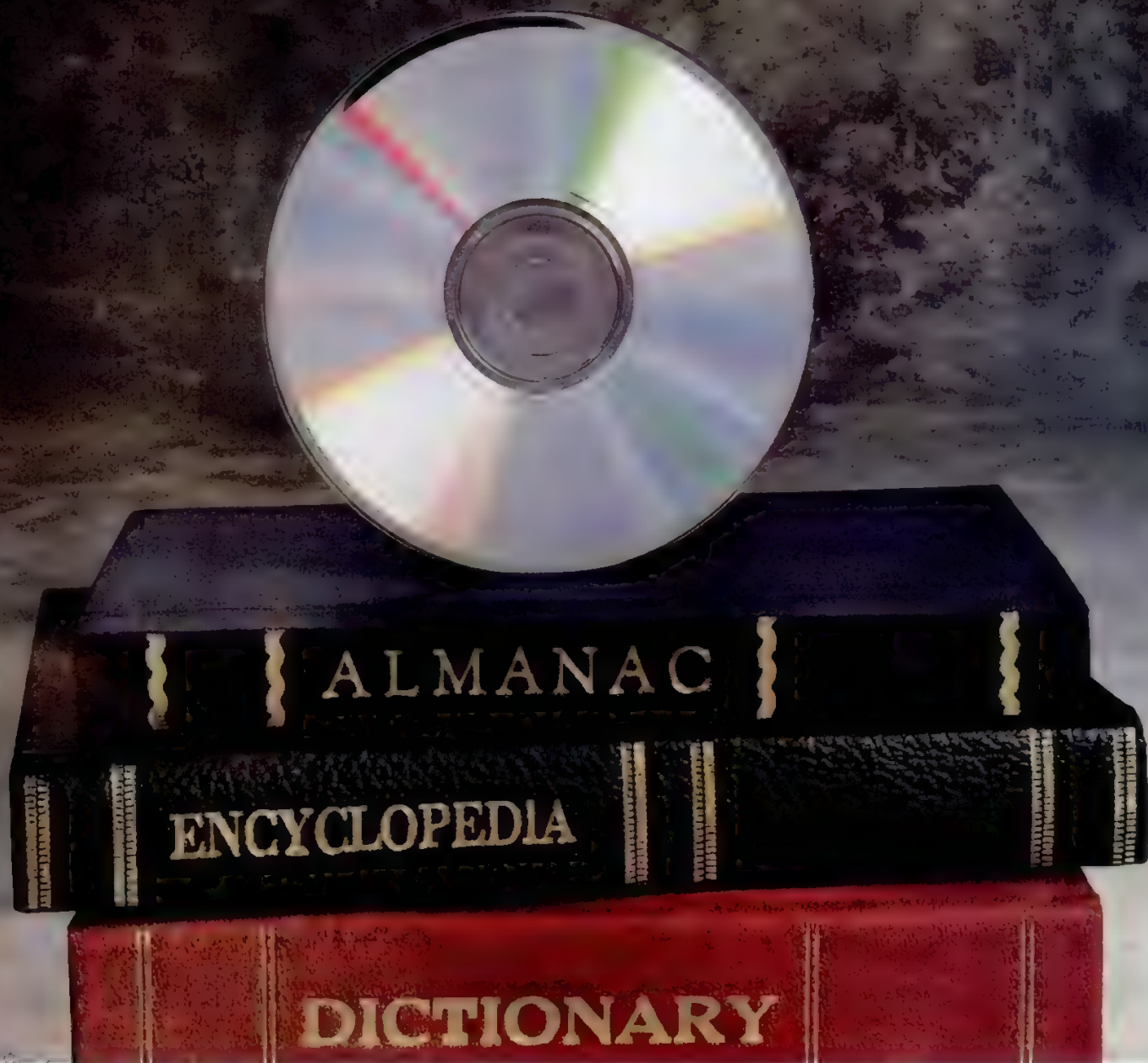
WANG LABORATORIES INC.

by Edward Mendelson



Wang Laboratories' 16-MHz 386SX Micro Channel machine is almost everything this model of desktop computer should be. At \$5,790 with 4MB of RAM, a 76MB hard disk, built-in 16-bit VGA card and monitor, and no RAM cache, it isn't cheap. Yet it's a compact and beautifully constructed piece of hardware, with room for more expansion cards than

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you normally get in a machine measuring 5.4 by 18.4 by 14.4 inches.

With an Adaptec controller and 8MB of RAM, the price of the test system comes to \$6,875. The basic configuration, with 2MB of RAM, a 1.44MB floppy disk drive, and keyboard, but no hard disk and no monitor, costs \$2,995.

In addition to the standard 1.44MB disk drive, Wang's small desktop case includes a second exposed 3.5-inch drive bay, as well as the single internal 3.5-inch bay for the hard disk. If you want to add a 5.25-inch floppy disk drive, you'll need an external model. You get five 16-bit MCA slots, including one with the video extension you'll need for an 8514/A card. You'll need one slot for the hard disk controller, but parallel, serial, and mouse ports are on the motherboard.

Wang doesn't give you a confusing set of options when you buy this machine. You can get a fast Imprimis 3.5-inch 76MB MFM hard disk, a slower 40MB hard disk, or no disk at all. Wang will sell you an 80387SX coprocessor chip for \$695. You can choose a 14-inch VGA monitor in monochrome or color. On either one you'll see the rather boxy screen font characteristic of the Chips and Technologies VGA chip set built into the motherboard.

EASY EXPANSION

Installation and expansion are simple enough to live up to most of the promises made for MCA designs. You don't need a screwdriver to open the case; you don't even need the coin required to get into IBM's PS/2 cases. Twirling two thumbscrews will get you inside, where you're likely to be impressed by the elegant solidity of the Wang-built interior.

You add RAM via standard SIMM banks located not too conveniently under the floppy disk drives. The sockets accept up to four 2MB SIMMS rated at 100 nanoseconds or better, for a total motherboard capacity of 8MB, but you can add 8MB more via a standard MCA add-in card. To reach the SIMMs or the socket for a 387SX coprocessor chip, you have to lift off a shelf that holds the hard and floppy disk drives, but the manual illustrates and explains this simple task with exemplary clarity.

Although the setup disk allows you to install hardware effortlessly, software installation requires some manual labor with CONFIG.SYS and AUTOEXEC.BAT. The SMARTDRV disk cache in-

COVER STORY MCA COMPUTERS

**FACT FILE**

Wang MC 350/16S
Wang Laboratories Inc., One Industrial Ave., Lowell, MA 01851; (800) 835-9264, (508) 459-5000.
List Price: With 2MB RAM, 1.44MB 3.5-inch floppy disk drive, one parallel and one serial port, mouse port, \$2,995; with 4MB RAM, 76MB hard disk, VGA monitor, DOS 3.3, \$5,790; with 8MB RAM, mouse, \$6,875.
In Short: Wang's 16-MHz 386SX Micro Channel machine is solidly constructed and reasonably priced, and it generously offers five expansion slots. But it failed one of PC Labs' compatibility tests and doesn't offer much room for additional storage.

CIRCLE 813 ON READER SERVICE CARD

stalls automatically, but you have to install the expanded memory driver by manually copying filenames. This is worth the effort, because the driver has a remarkably flexible set of options and runs in the OS/2 compatibility box. By the same token, the utilities that help control the keyboard and switch the VGA to CGA or Hercules-emulation modes do not install themselves automatically.

The Wang's front panel contains a power switch and the floppy disk drives, which display green and amber lights to show you whether they're reading a 720K or 1.44MB disk. The back panel holds the case lock and connectors, and you can also lock the keyboard via a password chosen during setup.

Wang offers one year of parts and labor service, available via any Wang sales office or authorized service dealer. While that kind of support policy is standard, you should note that the Wang MC 350/16S failed to install the Emerald City tape drive, although it passed all our other compatibility tests. It ranked among the slower machines in its class, but the differences among these machines are generally so slight that you should make a purchase decision based on features and quality rather than benchmark test results. If you're in the market for a compact machine with room for expansion cards, but you don't need much room for additional disks, Wang's MC350/16S deserves your attention. ■

Bruce Brown, John C. Dvorak, Edward Mendelson, Bill O'Brien, Winn L. Rosch, and M. David Stone are contributing editors of PC Magazine.

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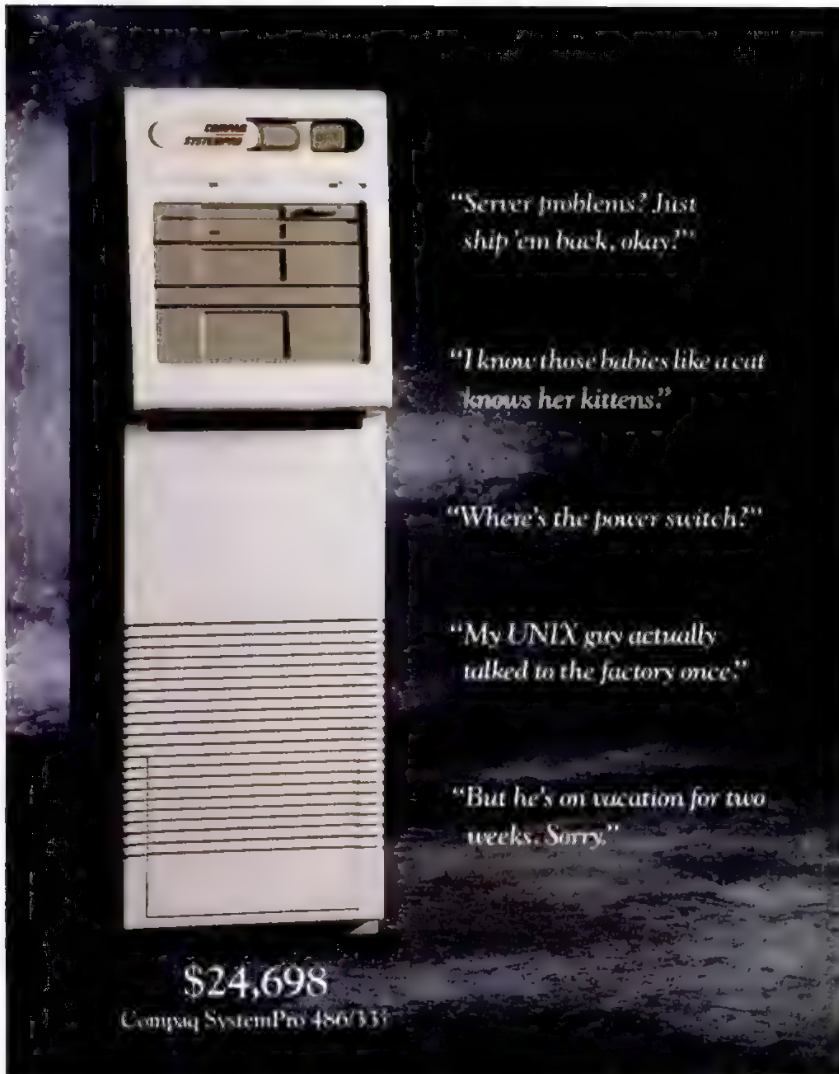
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WHAT SERVICE!

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WHAT SERVICE?

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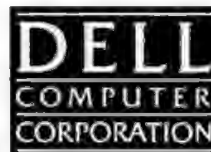


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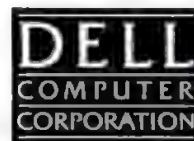
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CIRCLE 532 ON READER SERVICE CARD

Task Switchers

The **Hot** Key to Fast Application Access

by M. David Stone



Task-switching packages speed up your computing by letting you move from program to program at the touch of a key. The secret to their success: apps stay accessible but don't jam your RAM.

There's no doubt about it. The continuing success of the *DESQview* line of products and all the attention given to *Microsoft Windows 3.0* proves that PC users are hungry for the productivity gains achievable through multitasking environments. As we described in the last issue of *PC Magazine* (see "386 Multitasking Environments: Making DOS Work Overtime," October 16, 1990), multitasking environments allow you to run several applications simultaneously with off-screen applications remaining active in the background.

But what if you want an inexpensive solution that lets you move among applications quickly and doesn't require a 386 machine to perform well? An effective answer may be task-switch-

ing programs, which let you switch among applications at the touch of a key by holding programs in suspended animation while you work with one at a time. It's the look of multitasking without the background processing power or cutting and pasting between applications.

You might wonder why anyone would consider these more-limited task-switching packages, especially since multitasking environments like *Windows 3.0* can, of course, be used as task switchers. There are three situations in which a task switcher may be the preferred choice, and all stem from the fact that a multitasking environment places more demands on the computer's resources than a task switcher does.

SOFTWARE

TASK-SWITCHING SOFTWARE

First, if you have an older, slower computer, the performance penalty for running tasks in the background may simply be intolerable. Even if you can make good use of background operation—running a database sort while writing a report in the foreground, for example—you may decide that the trade-off isn't worth it.

At the other extreme, you may have the newest hardware with a super-fast hard disk and a 486 processor, but if you don't need the background processing capabilities of programs like *DESQview 386* or *VM/386*, you may not want to throw away processing power on multitasking environments that you aren't using.

A final way that you can take advantage of the relatively humble talents of task switchers is to use them as management systems for unruly terminate-and-stay-resident (TSR) packages. Notorious for gobbling up memory and tripping up applications, TSRs are tamed when you put each one in its own partition and swap it out of memory when it's not in use. The TSR is still just one keystroke away, but when it's out of sight, it's out of mind, literally. Your main application gets all the RAM it needs.

A USEFUL COMPROMISE

In all these situations, a task-switching package is a useful compromise because it will let you switch among programs in a single keystroke without costing you a performance penalty. Although specifics vary among individual programs, a task switcher will take a snapshot of the currently running program, data, and screen image, store it in memory, and then bring up the next application. When switching back to the first program, it reloads the snapshot that it previously stored. For greatest speed, task switchers will swap programs to and from extended or expanded memory and will use your hard disk only when memory is full. But even on a 4.77-MHz XT with nothing but a hard disk for swapping, a task switcher is still faster than exiting one program, loading the next, exiting it, and reloading the first.

Not so incidentally, if you've become used to a multitasking environment on your desktop system, a task-switching package is the perfect compromise for your less-powerful portable. You can also combine task switching and multitasking. For example, it's possible to load a task switcher in one *DESQview* task window

and run a database sort as a background task at the same time. Performance in the task switcher window will slow you down somewhat, but having only two windows open in *DESQview* won't slow you down nearly as much as if you had each program in its own window.

TWO WAYS TO SWAP

AutoSwap and *Dr. Switch* are really task chainers that build on the "Go to DOS" command in most programs. When you shell out to DOS, the task chainer will swap the first program out of memory to leave room for the next. But to get back to the first program, you have to leave the second by way of DOS. You can create a chain of programs this way, shelling out to DOS at each step. The task chaining approach is limited, yet has the advantage of simplicity. Since you can move only backward or forward, you don't have the random access you have with a task switcher, which swaps out to memory every time.



The clear editor's choice among task switchers is *Software Carousel*. *Software Carousel* makes no attempt to do anything fancy when handling TSRs like *HeadRoom* and doesn't offer a slick installation program to challenge *Switch-It's*. It also doesn't offer many partitions (12 are available). However, in our tests, it was the most stable task switcher of the group, and all the clever features in the world don't matter if the basic functions don't work.

An honorable mention is earned by *Back & Forth*, which came in a close second for stability and for the amount of memory it leaves for application programs. *Back & Forth* is a relatively new program that still has too many rough edges, but the promise of frequent revisions, plus the invitation to try before you buy (it's a shareware package) make it well worth your consideration.

The other packages that are reviewed here—*Back & Forth*, *HeadRoom*, *Software Carousel*, and *Switch-It*—are all true task switchers. All let you define multiple partitions and switch among them at will. A new version of *Dr. Switch*, which was unavailable for this review, will be a complete task switcher, but Black and White International expects to continue selling the task-chaining version as well.

Whether you spend half your day exiting one application and loading up another or are just tired of continuously battling with your TSR collection, task-switching packages are a simple, inexpensive way to smooth out the rough edges of your computing routine.

AutoSwap

Certainly the least ambitious of the programs reviewed here, *AutoSwap*, Version 1.2, is best described as a single-minded utility. Priced at \$49, *AutoSwap* is not a complete task switcher. Rather, Peerlogic has chosen the more-limited route of task chaining. The one clear benefit of this narrow focus is simplicity.

This simplicity starts with the program itself: a single file that takes up a mere 5.9K RAM. To use the program, you should include the *AutoSwap* directory in your AUTOEXEC.BAT path statement. You may also want to add a SET command to designate a disk to swap to. *AutoSwap* will switch to expanded memory (LIM 3.2 or later), but if extended memory is full, the package will swap to the currently logged disk unless the SET command states otherwise. The only way to use extended memory is as a RAM disk.

Using *AutoSwap* is straightforward. With *Lotus 1-2-3*, for example, you load the package with the command AS 123. To run another package, you exit 1-2-3 with the /System command. *Lotus 1-2-3* takes you to DOS, and *AutoSwap* frees up the memory. You can then run the second program, quit, and exit back to 1-2-3. One measure of *AutoSwap's* ease-of-use is that the well-written and complete manual takes only a few minutes to read.

NO MEMORY CONTROL

AutoSwap allows you to nest applications more deeply than you're ever likely to need. We ran seven applications in the test suite, shelling out to DOS with each. At every step in the chain, *AutoSwap* ties up

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SOFTWARE

TASK-SWITCHING SOFTWARE

FACT FILE

AutoSwap, Version 1.2
Peerlogic Inc., 555 DeHaro
St., San Francisco, CA
94107; (800) 873-7927,
(415) 626-4545.

List Price: \$49; network
version, \$199.

Requires: 256K RAM, DOS
3.1 or later.

In Short: *AutoSwap* is the ultimate in task-switching simplicity. It frees up RAM to let you run large programs after shelling out to DOS. However, it offers no support for swapping out TSRs or for running batch files.

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along with one copy of *Windows* in real mode.

As a task chainer, *AutoSwap* will work only with programs that have a Go to DOS command. Oddly, it won't run batch files, though you can include an AS command within a batch file. More troublesome is the fact that it doesn't deal well with TSRs unless they are loaded before *AutoSwap*. If you load a TSR and try moving back up the chain before removing it, *AutoSwap* responds with "Reboot Recommended," which means that you can no longer remove the TSR or exit up the chain. If you use TSRs often, this mistake is too easy to make.

Even with these limitations, *AutoSwap*'s simplicity has a certain appeal. \$49 is a fair price, even for such a narrowly focused utility, and if you live primarily in one program and just want the ability to load another one quickly and easily, *AutoSwap* will do the job. Just

don't mistake it for a full-fledged task switcher.

Back & Forth

Back & Forth, from Progressive Solutions, may well become the *ProComm* of task switchers. Like the original *ProComm*, *Back & Forth* is a full-featured package that happens to be shareware. If you're expecting a bargain price, however, think again. While \$69.95 is a low enough list price, you won't find *Back & Forth* available anywhere at a discount. Ironically, it ties with *HeadRoom* for the highest street price.

You can try *Back & Forth* by downloading it from a BBS or CompuServe (on CompuServe, type GO ZENITH, and go to section 13). The registration fee will get you a highly informative printed manual and free phone support, though you'll have to pay for the call. For this review,



TASK-SWITCHING SOFTWARE: SUMMARY OF FEATURES

Products listed in ascending price order

	AutoSwap \$49.00	Dr. Switch \$59.95	Back & Forth \$69.95	Software Carousel \$89.95	Switch-It \$99.95	HeadRoom \$129.95
OPERATIONAL FEATURES						
Largest session permitted	551K	558K	600K	561K	555K	520K
Maximum number of sessions	1	1	20	12	100	32
Cut and paste among sessions	☐	☐	☒	☐	☒	☒
Auto-search for program on-disk	☐	☐	☐	☐	☒	☒
Reboot confirmation request	☐	☒	☒	☒	☐	☐
Network support	☒	☐	☒	☒	☒	☒
Menu style	Command-line	Command-line	Point-and-shoot, command-line	Point-and-shoot	Point-and-shoot	Point-and-shoot
Mouse interface	☐	☐	☒	☒	☒	☐
Supports LIM EMS 4.0	☒	☐	☒	☒	☒	☐
Supports extended memory for applications	☐	☒	☒	☒	☒	☒
Supports VCPI for applications (a)	☐	☐	☒	☒	☒	☒
Supports DPML for applications (b)	☐	☐	☒	☒	☒	☒
Supports demand paging	☐	☐	☒	☐	☐	☒
Provides print spooler	☐	☐	☐	☒	☐	☐
Customizable hotkeys	☐	☐	☒	☒	☒	☒
Swaps to:						
Expanded memory	☒	☒	☒	☒	☒	☒
Extended memory (directly)	☐	☒	☒	☒	☐	☒
Disk (including RAM disk)	☒	☒	☒	☒	☒	☒
Specified disk drive	☒	☒	☒	☒	☒	☒
Currently logged drive	☒	☒	☐	☐	☐	☐
Multiple drives	☐	☒	☒	☐	☒	☒
Can run in expanded memory	☐	☐	☒	☒	☐	☒
Can run in extended memory	☐	☐	☒	☒	☐	☐
DOCUMENTATION/HELP						
On-line help	☐	☐	☒	☒	☒	☒
Tutorial	☐	☐	☐	☒	☐	☐
Free technical support	☒	☒	☒	☒	☒	☐

Editor's Choice ☒ Yes ☐ No

(a) Virtual Control Program Interface

(b) DOS Protected Mode Interface

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SOFTWARE

TASK-SWITCHING SOFTWARE

Progressive Solutions provided a registered copy of Version 1.38. The current policy is that all upgrades are free. Just download the new versions when you see them.

Back & Forth always loads its swap-definition screen first. This lets you define the amount of extended memory, expanded memory, and disk space to be used

the main menu hotkey is Ctrl-Alt-Space.

For each partition, you have the ability to define size, name, hotkey, and program to run. You can also define a DOS partition, or set a partition to handle a TSR. When loaded into high memory, partitions of 600K are possible. The largest partition size on the conventional memory test system left 542K available for an application to run in.

On PC Labs' benchmark tests, *Back &*



The *Back & Forth* main screen arranges its partitions on a point and shoot menu.

Alternatively, you can use the hotkeys (listed in the third column) to open or move to partitions. Note also the Setup choice in the function key menu at the bottom of the screen. With Setup, you can set all program options and define partitions.

for swapping. Once you've defined these settings, the program remembers them for future use. A nice touch is that you can define up to three drives for swapping.

SETUP MENUS

The main *Back & Forth* screen is a point-and-shoot menu that lists all of your defined partitions, up to a maximum of 50. You can run a maximum of 20 simultaneously. From this menu, you can go to a partition or to the setup menu, where you can define everything from *Back & Forth*'s colors to its hotkeys. As shipped,

Forth behaved as promised. It wouldn't load two copies of *Windows* in standard mode or load two copies of *Lotus 1-2-3*, Release 3, which was to be expected since *Back & Forth* doesn't control the application program's use of extended memory. It also crashed occasionally: once when loading *Lotus Express*, and once with *Windows* swapped out—a procedure that Progressive Solutions does not recommend. However, the program is generally stable, coming in a close second to *Software Carousel*.

FIX PLANNED

There are some rough edges and odd oversights to *Back & Forth*. The most serious is that when you reboot while *Back & Forth* is loading, you may wind up with a corrupted configuration file and need to redefine all the partitions and program settings. It turns out that the program writes to the configuration file while loading without keeping a copy of the file safely on disk. Progressive Solutions has a fix on the way.

Despite this and other small oversights, *Back & Forth* is well worth looking at, especially since you can try it before buying. The company promises frequent upgrades, so if it doesn't work with your

FACT FILE

Back & Forth, Version 1.38
 Progressive Solutions Inc.,
 131 Washington St., Lodi, NJ
 07644; (800) 833-4400, (201)
 473-2000.
 List Price: \$69.95.
 Requires: 256K RAM, DOS
 3.0 or later.

In Short: This shareware program defines up to 50 partitions and will let you open as many as 20 at once. It's also noted as one of the most crash-resistant on PC Labs tests. The company has a free upgrade policy as well.

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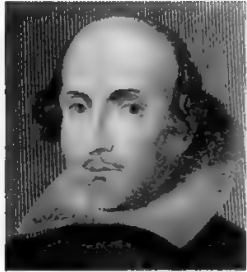
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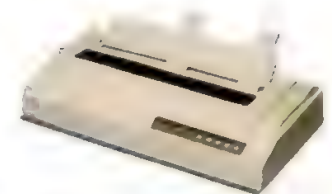


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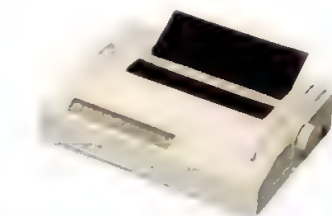
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favorite program this month, you may find that it will next month. The program will be of special interest to users of 4DOS and UltraVision, since *Back & Forth* is fully compatible with both. Keep your eyes open for the latest version of *Back & Forth* on CompuServe or on your favorite BBS.

Dr. Switch

Similar in concept to *AutoSwap*, *Dr. Switch*, Version 1.7, from Black & White International, is a task chainer rather than task switcher. However, *Dr. Switch* is a more-sophisticated program, able to run batch files and swap out TSRs as well as standard applications. The extra capability, with a list price of \$59.95, is only \$11 more than *AutoSwap*.

MEMORY MANAGEMENT

The cost for the additional capability in *Dr. Switch* is greater complexity. The program consists of 17 files that take about 258K of disk space. Among these are a setup module, text files, and three core utilities. The program also comes with Microsoft's HIMEM.SYS, which *Dr. Switch* needs in order to use extended memory. The program tries to swap first to expanded memory, then to extended

The complex *Dr. Switch* program consists of 17 files that take about 258K of disk space. Among these are a setup module, text files, and three core utilities.

memory, then to a specified disk, and finally to the current drive and directory. A set-up module lets you specify the swap drive and tell the program whether to use expanded or extended memory.

A nice touch in *Dr. Switch* is that, unlike *AutoSwap*, you generally don't have to load anything until you actually need it.

If you want to exit *WordPerfect* in order to run *Lotus 1-2-3*, for example, you use the *WordPerfect* Go to DOS command, and then start *1-2-3* with the command *DRSWITCH 123*.

TSR OPTIONS

Using *Dr. Switch* is more complicated with TSR programs. In fact, the package

offers several ways to handle TSRs. The most straightforward of these approaches uses two utilities: *DOSVECT* and *SCALPEL*. The *DOSVECT* utility identifies redirected DOS interrupt vectors and stores the information in a file. In order to swap out a TSR, you run *DOSVECT* before you run the TSR. After loading the TSR, you can swap it out by running the *SCALPEL* utility.

Unfortunately, the procedure for TSRs

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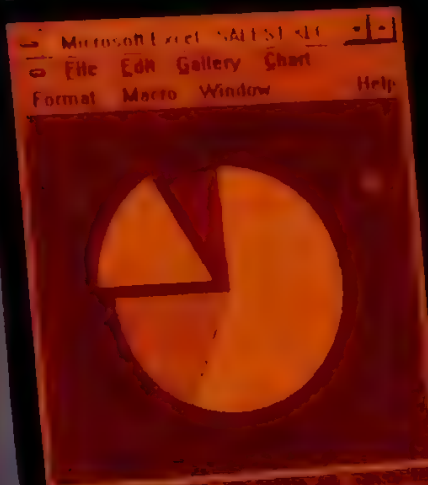
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4	Team discussion
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6	Meeting with Jane
7	Project update
8	Client meeting
9	Team meeting
10	Report review
11	Meeting with Bob
12	Project planning
13	Client feedback
14	Team meeting
15	Report final
16	Meeting with Alice
17	Project review
18	Client meeting
19	Team meeting
20	Report final
21	Meeting with David
22	Project planning
23	Client feedback
24	Team meeting
25	Report final
26	Meeting with Eve
27	Project review
28	Client meeting
29	Team meeting
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Microsoft Word - KEITH.DOC

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1 2 3 4 5 6 7 8 9 10 11 12

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RAM MANAGEMENT IN TASK-SWITCHING SOFTWARE

Software Carousel provides the most conventional memory to applications, and AutoSwap provides the least.

The Partition Size test shows the maximum amount of conventional memory available in five partitions for each of the task chainer and task switchers tested. For the four task switchers—*Software Carousel*, *HeadRoom*, *Back & Forth*, and *Switch-It*—we defined the five partitions to be as large as possible. We then opened all five and ran the PC Magazine MSCOPE utility in each to find the amount of memory available. For the task chainer—*AutoSwap* and *Dr. Switch*—we loaded *WordPerfect 5.1* at each step in the chain, shelled out to DOS, and ran MSCOPE, using the task chainer to swap the current program out of memory each time.

Note that the amount of memory available before loading the task switcher or task chainer is the same in all cases: 563K. The amount available in the first partition is the amount available after running a program called USEMEM, which we used to occupy 100K RAM to simulate an application in the first partition. To calculate the full amount of memory in the first partition for each program, add 100 to the

reported amount. As you read across the table from left to right, you can see that each of the four task switchers provides the same total amount of memory for each partition, though the amount differs among the programs. *Software Carousel* provides the most conventional memory to applications, and *AutoSwap* provides the least. All four task switchers successfully confined USEMEM to using memory in a single partition.

Both task chainer tied up some memory at each step in the chain. For these tests, *Dr. Switch* lost about 10K with each step, and *AutoSwap* lost about 11K. The actual amount varied depending on the loaded application. Only *Dr. Switch* was able to swap USEMEM out of the first partition. By contrast, *AutoSwap* was the only program that couldn't swap USEMEM out of memory, which is why it shows the least amount of RAM available for applications.

The tests were run on an 8-MHz AT with 512K RAM on the motherboard and 4MB RAM on an Intel AboveBoard. The AboveBoard was

installed to backfill conventional memory to 640K and to provide 1MB of extended memory. All remaining RAM was installed as LIM EMS 4.0, using the Intel driver. The system used an IBM EGA card with 256K memory, and was configured with *Buffers=20* and *Files=72* in the CONFIG.SYS file.

In addition to the Partition Size test, we ran each program through a set of compatibility tests. The application programs we tested with were *Microsoft Excel* running under *Windows 3.0*; *Lotus 1-2-3*, Release 2.2 and 3; *WordPerfect 5.1*; *ProComm Plus*; *Microsoft Word 5.0*; *HotLine 2.00*; *dBASE III Plus*; *Paradox*; *XyWrite III*; *WordStar 3.3*; and *Lotus Express*. For the four task switchers, we also ran an interrupted copy test: we started copying a file, tried switching to another partition in mid-copy, and then switched back to the first partition. In all cases, we ran the interrupted copy test with both XCOPY and the COPY command. All anomalies for these copy tests are reported in the product evaluations.

Partition Size

	Amount of conventional memory available (kilobytes)					
	Before loading program	In the first partition	In the second partition	In the third partition	In the fourth partition	In the fifth partition
Software Carousel	563	452	552	552	552	552
Back & Forth	563	442	542	542	542	542
Switch-It	563	432	532	532	532	532
HeadRoom	563	408	508	508	508	508
Dr. Switch	563	552	542	532	522	512
AutoSwap	563	451	440	429	417	406

isn't explained well in the manual, which is the weakest part of the package. Free phone support lessens this drawback, but support is available only from 10 A.M. to 4 P.M. Eastern time. Alternatively, you can get support by mail or through CompuServe's EasyPlex e-mail system.

As with *AutoSwap*, *Dr. Switch* will let you nest programs—although the manual doesn't point this out. In PC Labs tests, *Dr. Switch* used 8K to 10K of RAM for each step in the chain. *Dr. Switch* does not control other programs' use of extended

memory. Not surprisingly, it wouldn't run two copies of *Microsoft Windows 3.0* in standard mode or run a second copy of *Lotus 1-2-3*, Release 3, after shelling out from the first copy. It handled all the other application programs in the test without notable problems.

Ultimately, *Dr. Switch* is limited simply because it's a task chainer. If all you want is the ability to shell to another program quickly and easily, *Dr. Switch* may be all you need. If you also need to swap out TSRs, *Dr. Switch* is your only choice among task chainer.

TWO PROGRAMS IN ONE

HeadRoom 2.02e is really two programs in one: a task switcher and a TSR handler. As a task switcher, it provides a separate partition for each foreground program, with each program walled off from the others. As a TSR handler, it swaps TSRs in and out of each partition that happens to be active. Call up a TSR from within a partition, and it will act as if it were loaded within the partition. For example, the TSR will be able to read text from the partition screen or paste text into the screen.

This approach has much the same effect as loading all your TSRs before loading the task switcher, except that, regardless of the number of TSRs you have loaded, it only costs you about 50K of conventional memory.

For advanced users, *HeadRoom* has an automatic swap feature that's designed to swap in a print spooler whenever an application sends data to a printer. Using this feature can be tricky. On PC Labs' benchmark tests, the option for swapping at a specified time occasionally crashed the system. Clearly, this is not one of the features to use with reckless abandon when

HeadRoom

Of all the task switchers reviewed in this issue, *HeadRoom*, from Helix Software, is the most expensive, carrying a price tag of \$129.95. It's also the most ambitious task switcher, with a unique approach to TSRs that differs radically from any other available program, and for that matter, from *HeadRoom*'s own approach to foreground programs.



FACT FILE

Dr. Switch, Version 1.7
Black & White International
Inc., P.O. Box 1040,
Planetarium Station, New
York, NY 10024; (212) 787-
6533

List Price: \$59.95.

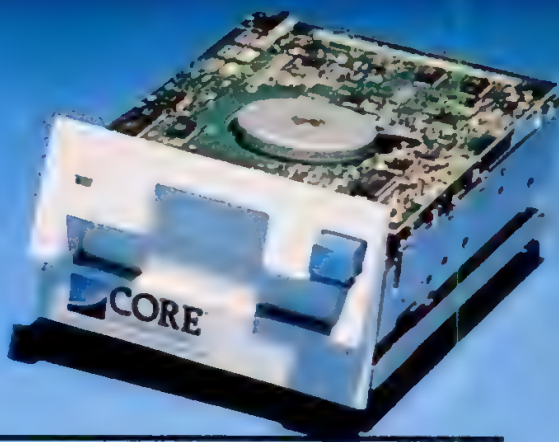
Requires: 128K RAM, DOS
2.0 or later.

In Short: Limited to task chaining by shelling
most applications to DOS, *Dr. Switch* gains
versatility by swapping out TSRs and running
batch files as part of the chain.



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SOFTWARE TASK-SWITCHING SOFTWARE



FACT FILE

HeadRoom, Version 2.02e
Helix Software Inc., 83-65
Daniels St., Briarwood, NY
11435; (800) 451-0551,
(718) 262-8787.
List Price: \$129.95.
Requires: 128K RAM
(640K recommended), DOS
2.1 or later.
In Short: TSR junkies take note: *HeadRoom's*
approach to handling TSR swapping is the
functional equivalent of loading all your TSRs
before loading a task switcher, but you use
only about 50K RAM—regardless of how
many TSRs are loaded.

CIRCLE 402 ON READER SERVICE CARD

peatedly until Helix suggested setting Files to 255 in the CONFIG.SYS file, rather than using the far lower setting suggested in the manual. Even with the new setting, *HeadRoom* had problems with *Windows* in standard mode, but this is a known problem with Microsoft's HIMEM.SYS. In general, *HeadRoom* performed well, once the CONFIG.SYS was set up correctly. As shipped, *HeadRoom's* hotkey is Alt-Enter, though you can easily redefine it. Point-and-shoot menus are reasonably self-explanatory, but if you need help, you'll have to go to the manual, which is well-written and informative.

The biggest disappointment in *HeadRoom* is that it doesn't do everything it might. The automatic swap feature offers some tantalizing possibilities for background communications, for example, but in the current incarnation, this feature often needs too much tweaking to be practical. Even so, *HeadRoom* is a tempting choice for TSR junkies who want all their TSR features available to all their foreground programs.

Software Carousel

First released in April 1986 from SoftLogic Solutions, *Software Carousel* was one of the first task switchers on the market. Now in Version 4.0, it remains one of the



FACT FILE

EDITOR'S CHOICE

Software Carousel, Version 4.0
SoftLogic Solutions Inc.,
One Perimeter Rd.,
Manchester, NH 03103;
(800) 272-9900, (603) 627-
9900.
List Price: \$89.95.
Requires: 256K RAM (640K recommended),
DOS 2.0 or later.
In Short: One of the first task switchers on the
market, *Software Carousel* is also one of the
most crash-resistant. Although limited to only
12 partitions, it offers several useful utilities
including a print spooler that can print data
created in one partition while you work in
another.

CIRCLE 403 ON READER SERVICE CARD

sions is less than what the other programs allow, it's probably more than you'll need at one time.

The straightforward install routine copies the main program, the print spooler, and the setup modules to your hard disk. It ignores the utility files, leaving them for advanced users to copy as needed. The utilities solve problems such as running *Windows* in a partition, even though *Windows* won't pass the hotkeys to *Software Carousel*.

CUSTOM MEMORY AND PARTITIONS

The setup module lets you customize almost every important feature. You can set the program to run in expanded or extended memory—both keep conventional memory needs down to 13K. You can also tell the program whether to use expanded memory, extended memory, or disk space for swapping, and the amount of each. Be aware that when you load *Software Carousel*, it immediately takes possession of all the memory and disk space allotted to it. That means you can't tell it to use all your extended memory and then expect to run a program that needs extended memory such as *Lotus 1-2-3*, Release 3.

Other setup options let you define the size, name, hotkey, color combination, and up to 12 lines of DOS commands for each partition. On the test system, we defined all the partitions to the largest available size, leaving 552K available to each program.

As shipped, the hotkeys are Alt plus a function key—Alt-F1 through Alt-F12 for the 12 partitions, Alt-Space for the *Software Carousel* menu, and so on. You can change any of the hotkeys to your taste.

you're working with important data.

As a task switcher, *HeadRoom* is typical. The setup utility asks about your video card and other configuration issues, then lets you define up to 32 partitions. For each partition, you define a name, program path, hotkey, and a swap location (expanded memory, extended memory, or disk).

SOME OVERSIGHTS

Missing from this list of partition definitions is a way to define partition size. *HeadRoom* supplies each foreground program with the maximum available memory—508K for each program in our tests. Unfortunately, this approach quickly eats up extended and expanded memory, forcing you to swap primarily to disk.



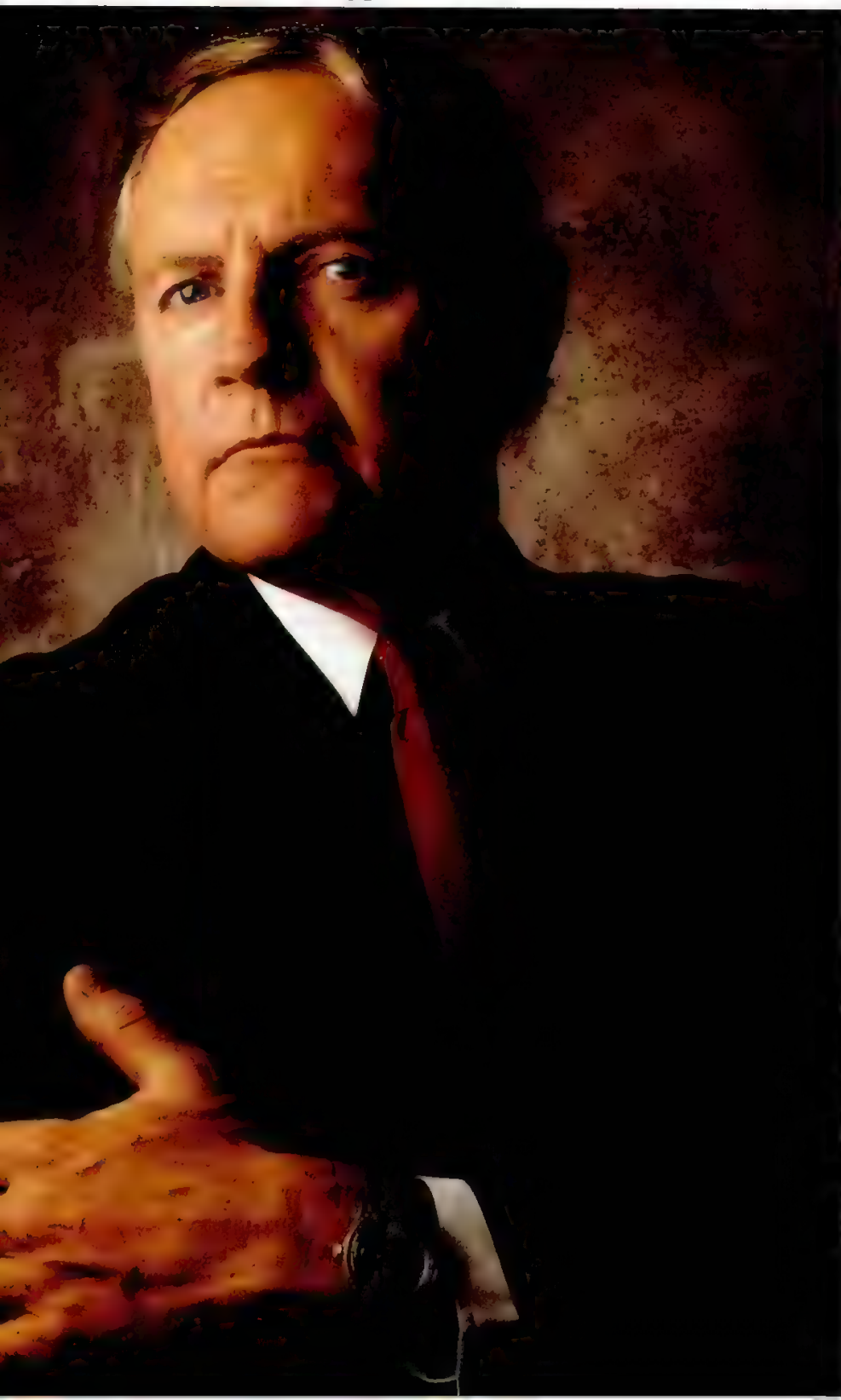
The *HeadRoom* options screen is available while running *HeadRoom* itself, so that you can change at least some configuration options on the fly. The main menu, with a list of available partitions, is shown here partially covered by the options menu. Both are popped up over *Lotus 1-2-3*.

Helix says the next version will let you set each partition size independently. TSRs, on the other hand, automatically get the amount of memory that they need.

On our tests, *HeadRoom* crashed re-

best. This \$89.95 package offers extensive customization features, a myriad of utilities, and a print spooler for output created in one partition while you work in another. While the maximum of 12 ses-

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SOFTWARE TASK-SWITCHING SOFTWARE

One particularly nice option is "boot watch," which intercepts the Ctrl-Alt-Del command and asks you to confirm your desire to reboot before it happens. This feature forces you to remember whether you've left some unsaved work in another partition.

Software Carousel uses self-explanatory point-and-shoot menus. The only time that you should need to use the well-written manual is to tweak the program for greatest possible efficiency or to explain the utilities.

Ultimately, the best thing about *Software Carousel* is that it works. On PC Labs' tests it encountered only minor problems. When hotkeying back to a

Technology's *Switch-It*. *Switch-It* has the ability to let you list 100 partitions on its main menu and opens all of them—or at least the majority of them—at once. The 100 partitions are more than you should ever need. The real benefit of allowing such a long list is that it makes more-efficient use of your resources. You can define a small 1-2-3 partition for small spreadsheets and a larger one for large spreadsheets.

AUTO-INSTALL

With most task switchers, defining 100 partitions would be a chore, but *Switch-It*

The *Software Carousel* core program offers few options, with most configuration choices in a separate program. However, the main program lets you change the memory size for inactive partitions and the name for any partition. The squares to the left of the memory size (for *ProComm Plus* and *Microsoft Word*) show the active partitions.



previously created 1-2-3 graph, it changed the palette but handled the graphic adequately. It wouldn't let 1-2-3, Release 3, run in two partitions or let *Windows* run in standard mode in two partitions. However, that was expected, since there is no attempt to manage other programs' use of extended memory.

Most important, *Software Carousel* did an impressive job at surviving our tests. Even when it was unable to handle a task, it rarely crashed the system. Quite simply, *Software Carousel* performed more reliably on PC Labs' performance tests than any other task switcher reviewed here. And that's the characteristic that puts it way out in front of the pack.

Switch-It

If you are among those who believe that more is always better, you will probably be interested in Better Software

makes it nearly painless. An automatic installation routine scans your drive, then installs any program it recognizes. In our tests, *Switch-It* found all but three of the programs in the test suite, and installed them complete with appropriate partition sizes. That kind of automation is a big help.

INSTALLING MULTIPLE PARTITIONS

Another extremely useful touch is a setup option that duplicates an entry in a single keystroke. To install multiple partitions, you are only required to make a copy of the original, then make changes on the duplicates. For each of the partitions, you can define title, size, hotkey, program path and name, program switches, and preferred swap area—expanded memory or disk. If you choose to swap to expanded memory and eventually run out, *Switch-It* will still swap to disk. The setup program also lets you designate *Switch-It*'s swap drive and lets you change the *Switch-It* hotkeys. As shipped, the main menu hot-

FACT FILE



Switch-It, Version 3.0
Better Software Technology Inc., 55 New York Ave., Framington, MA 01701; (800) 848-0286, (508) 879-0744.
List Price: \$99.95.
Requires: 512K RAM, DOS 2.0 or later.
In Short: *Switch-It* offers a slick installation module and the ability to define up to 100 partitions—far more than any other task switcher.



CIRCLE 404 ON READER SERVICE CARD

key is the Alt-Home key.

The main program is certainly nowhere near as slick as the setup module. In PC Labs' tests, *Switch-It* crashed significantly more often than any other program that we tested. One of the problems turned out to be the handling of conflicts at the comm port—a problem that Better Software claims to have solved for upcoming release 3.22.

But even when we excluded the offending programs—*HotLine*, *ProComm Plus*, and *Windows*—*Switch-It* still crashed occasionally for no apparent reason. It also insisted on throwing a *XyWrite III* screen into 40-column mode, requiring an exit to DOS and a MODE CO80 command.

ERRATIC RESULTS

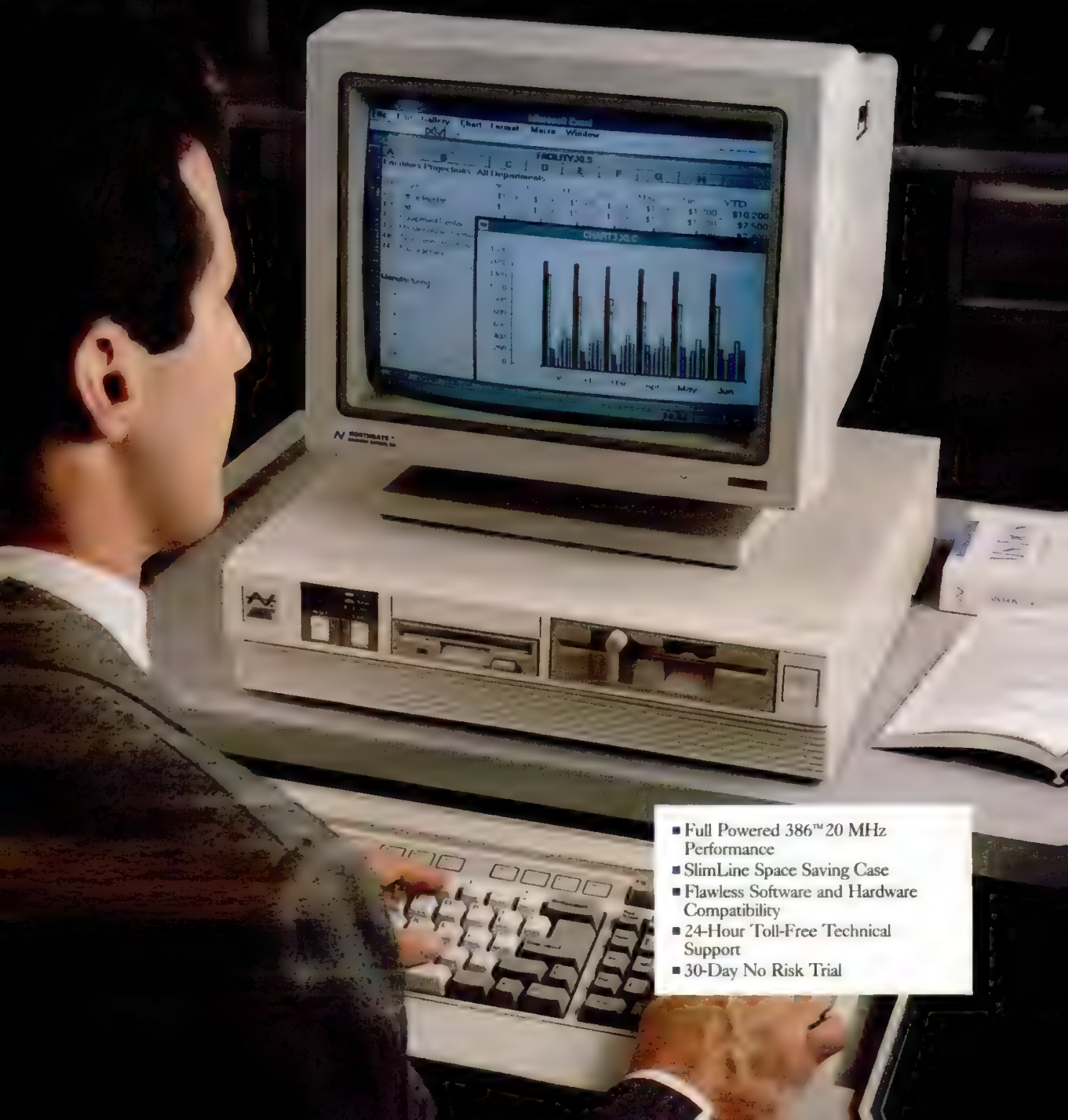
Even more troubling is *Switch-It*'s difficulty in handling the interrupted copy test. Where other tested programs would either refuse to switch during an active copy command or would switch out and then pick up exactly where they left off, *Switch-It* gave erratic results. In some test runs the copied file was a different size than the original file. In others, we ended up with the original file missing and only a partial copy remaining.

In the final analysis, *Switch-It* is a good idea, but one that is in need of further development. The installation routine and point-and-shoot menus are well thought out and easy to use, but the main program quite simply stumbles far too often. If Better Software succeeds in making *Switch-It* a more robust program, it could easily become a winner. But as things stand, it's not your best task-switching choice. ■

M. David Stone is a contributing editor of PC Magazine.

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Jerry Pournelle* on Northgate Page Mode 386/20**

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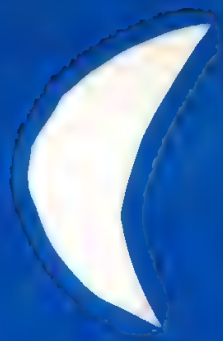
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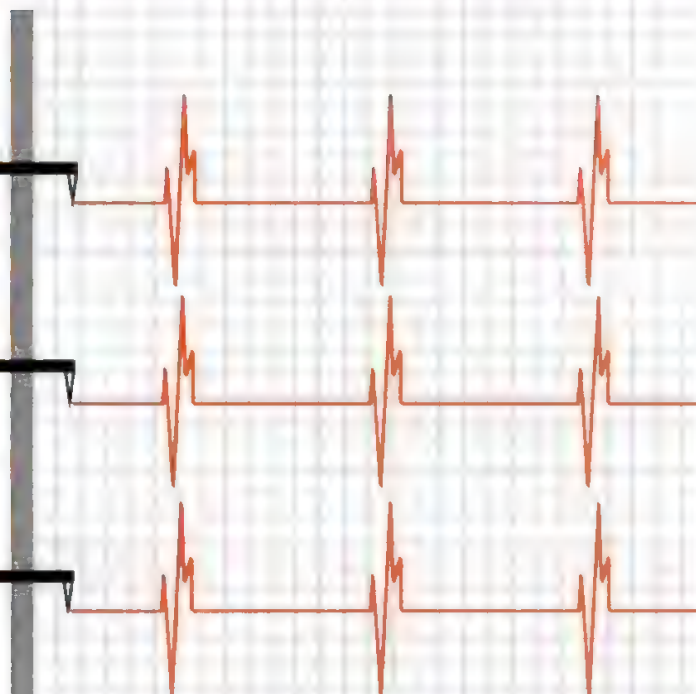
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STATISTICAL REPORTING SOFTWARE

by Kimberly Maxwell

LAN statistical reporting programs gather data and alert administrators to potential trouble spots. PC LAN Labs reviews 20 packages that produce detailed reports on network activity.



As LAN technology grows in complexity, it gets harder and harder for networks to run at their fullest capacity. Some file server hard disk drives hold too much data, while others don't hold enough. Network cable runs are overloaded or underused. Viruses lurk. And sometimes, people just abuse the system for no reason at all.

But help is available. A host of new programs now report statistical data that administrators can use to create a productive and efficient LAN environment. These products range from programs that check the LAN for simple technical problems to others that look for overuse or abuse of an application. Because they are third-party add-on software packages, you can install them on your LAN to complement any statistical reporting and management control capabilities your network operating system already supplies.

PC LAN Labs evaluated 20 statistical reporting programs. These consist of The LAN Support Group's *BindView Plus*, Ashton-Tate's *Control Room*, Fifth Generation Systems' *Direct Net*, Fresh Technology Group's *Fresh Utilities*, Frye Computer Systems' *Frye Utilities for Networks*, Dolphin Software's *LAN Command*, Athena Software's *LAN Director*, Network Management's *LANtrack*, J. A. Lomax Associates' *The Lomax Utilities*, Blue Lance's *LT Stat Plus*, Cheyenne Software's *Monitrix*, ETI Software's *NetCompanion*, Brightwork Development's *NETreports*, Daystrom Data Products' *Outrider*, International Computer Group's *Perfect Menu*, Saber Software Corp.'s *Saber File Manager*, TGR Software's *SCUA Plus*, SoftShell Systems' *SoftBreeze*, Thomas-Conrad Corp.'s *TXD*, and Network General Corp.'s *Watchdog Network Monitor*.

ORIGINAL ANCESTOR

Statistical reporting programs are old hat in minicomputer systems. Minicomputer administrators can generate printouts many inches thick showing performance, storage, and resource management statistics. It's natural then that Banyan's *VINES* LAN operating system, based on the Unix minicomputer operating system, was the first of the PC-based LAN operating systems to offer strong statistical management tools.

Novell's *NetWare* has since become popular because of its hot marketing and fast performance, but to hold on to its lead and gain acceptance in the mahogany-paneled world of big business, *NetWare* needs auditing and management control tools to compete with minicomputers. Novell took some steps to improve reporting under *NetWare 386*, but several vendors reviewed here now offer complex statistical reporting software for *NetWare* and other network operating systems.

COMPLEX ALTERNATIVES

The applications reviewed by PC LAN Labs range from basic activity-reporting software to complex statistical gathering programs. Almost all of these packages gather operational statistics without using a special wiring hub or monitoring hardware. *Watchdog* is the one exception; it includes a special high-quality Ethernet card for the workstation acting as the report gatherer. Using a simple menu-driven system, *Watchdog* gives you detailed information about your network and alerts you with a message and sound when network activity reaches any threshold or limit.

The statistical data you collect with reporting programs constitutes a day-to-day assessment of your operation. It serves as a baseline to assist in LAN troubleshooting and as a platform for planning growth. The programs allow you to compile and format LAN information so that you can see statistics before and after a problem or change in the network. Information such as this is valuable for finding problems and for projecting requirements and budgets. Programs that create data files in *dBASE* or comma-delimited ASCII formats also lend themselves to financial analysis tasks.

Some of the programs alleviate such potential problems as viruses by watching the network for signs of infection and alerting a LAN administrator when the first symptom appears. The reporting software can also call attention to faulty programs or files that have a slight change from the



EDITOR'S CHOICE

- Monitrix
- Watchdog Network Monitor

Have you ever needed the nitty gritty on how people use your network? We found many types of products in the market able to gather information on LAN activity, but a lot of them look and work a lot alike.

We based our Editor's Choice decision on the features and statistical reporting capabilities of each product we reviewed. Two products, Cheyenne Software's *Monitrix* and Network General's *Watchdog Network Monitor*, clearly show initiative in design and an understanding of what kind of information an administrator needs to manage a LAN. Both give useful information in a report format designed for analysis of operations and problems. *Watchdog* is a real-time monitoring product that even barks when it detects an error condition on the LAN. The software part of the product installs either on a workstation hard disk or a network drive. On the other hand, *Monitrix* literally hides on your *NetWare* server

and gathers statistics at the source of the action.

Several products deserve honorable mention. We particularly like International Computer Group's *Perfect Menu*, Athena Software's *LAN Director*, Ashton-Tate's *Control Room*, and Daystrom Data Products' *Outrider*.

Perfect Menu provides both control and monitoring, along with unusual features like peer-to-peer communications, e-mail, and virus detection. *LAN Director* gathers specific information on files and directories in your Novell server; it also offers a tree-structure interface and annotated directory listings. *Control Room* gives such an outstanding and understandable analysis of the intricate internal workings of a workstation that it's eerie. *Outrider* gives great real-time reports at low cost, with an easily understandable traffic light-type display of the network's status.

Each product, in a unique way, fills a special niche in your LAN statistical reporting needs.

original. An example is *SCUA Plus*; it alerts you to a possible network virus and helps find any unwanted or disruptive file. Other products detect network bottlenecks and inform the administrator, improving efficiency and performance. Several programs are useful in finding out if you need additional memory on your server or if you need to upgrade an application.

Managing users' access rights, along with other network security issues, can be a hassle. Some packages help by adding their own simple security schemes to those built into the LAN software. Front-end menu products that run on every PC and keep users away from DOS, like *Perfect Menu*, significantly limit security and access problems.

NOVELL MAKES IT EASY

Most of the statistical reporting packages designed for *NetWare* offer features similar to those of Novell's own utilities. They also integrate tightly with the *NetWare* operating system's own internal structure.

Novell simplified tight integration of

third-party products in mid-1989 when it released Version 1.1 of its *Professional Development Series* package. This two-volume set of Novell red binders and software provides a library of *NetWare*-unique C-language extensions to system developers of network applications.

Using this library of calls to *NetWare*, programmers can write code in a few weeks that used to take months to create. You can expect to see increasingly sophisticated management tools for *NetWare* emerging in the next few months.

REVIEW CRITERIA

In many cases, additional features of these statistical analysis programs overlap with the LAN metering programs reviewed here earlier this year (see "Building Workgroup Solutions: LAN Metering Software," *PC Magazine*, September 11, 1990). Software designers have created many combinations of program capabilities, but metering and statistical reporting are two useful ways to categorize them.

In the earlier review, we looked at Triti-



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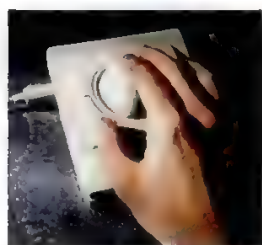
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CONNECTIVITY

STATISTICAL REPORTING

com's *ARGUS/n*, Certus International's *Certus LAN 2.0*, LANSystems' *LANShell*, Network Management's *LANtrail*, Blue Lance's *LT Auditor 2.03*, NETinc's *NetMenu*, Aldridge Company's *PreCursor 4.0*, Saber Software's *Saber Meter*, Brightwork Development's *SiteLock*, Connect Computer's *Turnstyle*, and McCarty Associates' *Workstation Manager*. *Turnstyle* and *SiteLock* won Editor's Choice.

PRODUCT SPECIALTIES

Comparing the cost of complex products—such as the 20 evaluated here—is difficult; some companies list a per server price, others charge a price per user. Some products, like *Outrider*, seem like giveaways at only \$90 per network; others, like *SCUA Plus*, are priced according to the system and number of users. Since packages differ in features, functions, RAM requirements, reporting capabilities, and where you install them on the network, you should evaluate their price according to your needs. Some products work within the network server, some run in a single PC, and some install on every PC in the network. Several products work only with Novell *NetWare*, while others function with a variety of network operating systems.

Some *NetWare*-specific packages run in the server as an *Advanced NetWare 286 Value Added Process (VAP)* or a *NetWare 386 NetWare Loadable Module (NLM)*. *Monitrix*, a network monitoring program, seems to disappear on the file server after you install it there. Users at workstations don't see it running. Two differently priced versions of *Monitrix* are available, a *NetWare 286 VAP* and a *NetWare 386 NLM*. Server-based VAPs and NLMs work more efficiently when reporting server usage because they get near the action on the network server.

NetWare-specific packages usually specialize in a particular task or do something else unique that allows the LAN manager to track or trace network usage. For example, some packages link to *NetWare*'s bindery, a special database containing definitions and information on servers, users, and applications. *BindView Plus* offers a complete screen picture of network usage and prints reports based on the *NetWare* bindery.

Other products specialize in reporting file server disk cache information. Good disk cache information not only helps increase your LAN's execution speed but

STATISTICAL REPORTING PROGRAMS: SUITABILITY TO TASK

Statistical reporting programs do much more than generate reams of paper or files that fill up your backup cartridges. We rated these systems on the basis of their ability to handle Novell management, real-time monitoring, calculating expenditures and growth, and daily administration. Use these ratings to choose the program that will best suit your needs.

THE TASKS

Each statistical reporting program is rated according to its usefulness for performing four tasks.

NOVELL MANAGEMENT measures how well-suited a product is to the Novell network management environment. We kept in mind that some statistical reporting products work on any network operating system, while the design of others makes them specific to Novell's *NetWare*. Even *NetWare*-only packages vary in how closely they integrate with *NetWare* and its existing utilities.

REAL-TIME MONITORING reports how well the programs cover the breaking news. We noted that some packages provide statistical histories while others inform you of problems or events on a minute-by-minute basis.

also enables you to keep the network running smoothly. *Fresh Utilities* and *LT Stat Plus* have such a cache report facility, but their reports show different types of data in various formats.

A unique feature of *TXD* allows it to perform its statistical reporting tasks even when the network malfunctions. If the server is down, *TXD* runs node-to-node to give you a clear picture of your system's current status. This capability could be very important if you need to trace an intrusion or problem.

Two packages, *Perfect Menu* and *LAN Command*, include an extra feature, a no-frills electronic mail system, but differ in their approach to mail capabilities. *LAN Command*'s e-mail system, while simpler to use, nevertheless supports multiple network operating systems in the same environment. *Perfect Menu* supplies a much stronger communications utility, including a useful chat feature.

Network statistical reporting packages

RATINGS KEY

Completely Unsuit				
Poor	1			
Adequate		2		
Good			3	
Excellent				4

EXPENDITURES AND GROWTH rates the products for their suitability in justifying network expenditures and planning growth. Network managers often deal with the important task of long-term planning and budgeting. Statistical reporting software can supply backup material critical to the process of projecting future needs.

DAILY ADMINISTRATION scores the reporting packages' suitability in simplifying daily network administration activity. Some products include utilities and other tools to make your day-to-day tasks easier and simplify common jobs. Products that help you do things faster and better on a daily basis rate highly in this task.

aren't glamorous. But they can help a network manager work more efficiently, plan more effectively, and spot threatening situations before they become problems. You don't have to select only one of these products. You'll want to mix and match the best blend of reporting products to meet your network needs.

BindView Plus

by Gaylan W. King

Network administrators need a management tool if they grant users access to *NetWare*'s bindery database. The LAN Support Group, developer of *BindView*, has created a well-conceived tool for them. The Novell bindery offers a repository for information regarding users, user groups, print queues, file servers, and account charge rates on file servers. *BindView*

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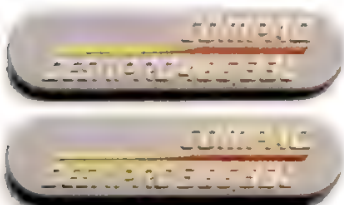
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Plus's \$149 per site price should prove enticing to those wanting a key to this exclusive cache of essential system facts.

To install *BindView Plus*, you simply make a directory and copy the application diskette into it. *BindView's* documentation suggests using the *NetWare FLAG* com-

BINDVIEW PLUS		
SUITABILITY TO TASK		
Novell management		3
Real-time monitoring	2	
Expenditures and growth		3
Daily administration		3

mand from the command line to make the bindery sharable and read-only. After *BINDVIEW.EXE* displays the first menu, everything will look familiar to Novell users; the system interfaces appear virtually identical. *BindView Plus* uses a minimum of 300K RAM (although The LAN Support Group recommends 450K).

VIEWING BINDERY OBJECTS

Available options in *BindView Plus* include View Bindery Objects, Bindery Reporting, and Change Server. The program stores information in the bindery as *objects*, *properties*, and *property values*. A bindery object forms a physical or logical entity on the network; it may possess multiple properties or none. A bindery property, in *Bindview Plus* terminology, means a category of information associated with a particular bindery object, such as a user group or print queue. A property value corresponds to the actual information contained in a property. *BindView Plus* stores property values as 128-byte blocks, referring to them as *segments*. A property value may have multiple segments or none. Some properties have identifications defined by Novell and its *NetWare* operating system.

By selecting View Bindery Objects from the first menu, you display a list of object types. The menu offers All Objects, User, User Group, Print Queue, File Server, Print Server, and Novell Undefined. The latter appears only if the current file server's bindery contains object types that are not Novell defined. *BindView Plus* limits the user to his or her normal access level based upon granted rights. Supervisors and their equivalents have the right to view most of the bindery database.

We were impressed when we selected

CONNECTIVITY STATISTICAL REPORTING

the View Bindery Objects option. System managers will appreciate the ability to display such a vital array of data from a single application. *BINDVIEW.EXE* features an internal report generator, but more-controlled and more-complete reports are available through a separate report generator program called *Bindrpt*. *BINDRPT.EXE* incorporates a Report Configuration Files option to generate bindery user or file server reports designed for use by network administrators. It creates configuration files for each category of report offered. With any file editor, the user can modify existing .CFG files to suit specific needs or follow the complete instructions to build a set from scratch.

LAN SUPPORT

With *BindView's* report generator you can build a single, complete set of files for each user, user group, and file server. You can also do instant comparisons of the data, as well as error checks. Though it is not primarily a diagnostic tool, *BindView* aids diagnostics through its ability to search the bindery database for inappropriate or corrupted data.

The people at The LAN Support Group seem knowledgeable and eager to help the customer; they offer excellent technical



FACT FILE

BindView Plus, Version 2.1
The LAN Support Group Inc., 520 Post Oak Blvd., #100, Houston, TX 77027; (713) 622-4900.
List Price: \$149 per network; current *Bindview* users can upgrade for \$35.
Requires: 300K RAM (450K recommended); supervisor or equivalent status to generate reports; *NetWare* 2.0 or later or *NetWare* 3.86.
In Short: *BindView Plus* unmask the mysteries of the Novell bindery—the system database that contains all network information. Intended for system administrators, this useful tool creates incisive reports and maintains them by category. Its low price will help make it a favorite utility.

CIRCLE 420 ON READER SERVICE CARD

support. They understand their product and try to make life easier for those who manage networks of any size. The next time you wonder if anyone out there knows what's going on, think of The LAN Support Group and *BindView Plus*.

Control Room

by Kimberly Maxwell

No, buying Ashton-Tate's *Control Room* won't furnish you with an office where you control your LAN activities. At \$129 per workstation, *Control Room* provides a system analysis of your PC's components and capabilities, along with information and advice to help you customize and fine-tune your machine. A visually spectacular

CONTROL ROOM		
SUITABILITY TO TASK		
Novell management		3
Real-time monitoring		3
Expenditures and growth	2	
Daily administration		4

program, *Control Room* offers an impressive array of useful operations.

Ashton-Tate's software designers give you the ability to retrieve detailed statistical reports about each workstation's equipment or software. The information loads into files compatible with ASCII or *dBASE* file formats. *Control Room* then organizes the information in report format so that you can print and compare the data from each workstation on the LAN.

Control Room will operate on any DOS-based machine with a minimum 384K of RAM. Its price includes a one-workstation site license, a manual, and software. Ashton-Tate hasn't priced a multiuser version of the software yet. The program documentation includes general information on product installation, features, and operation. If you have difficulty using the application, the on-line help feature provides detailed instructions. The package also comes with a complete 20-page guide with information on Ashton-Tate's technical support programs. This booklet lists the times to call for technical support, the range of costs, and on-line BBS information.

CONFIGURABLE DIAGNOSTICS

The application itself includes two programs: a system diagnostic program with a series of options, and a 20K TSR that gives you options every time you turn on your PC. The system diagnostic program checks the PC whenever you load the program and on command from the menu. Se-

Why Our New Zoom/Modem with Sendfax is Twice as Good as any Ordinary Modem.

It sends files from your PC to another computer.



Or, it sends them directly to any fax machine.



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It's a great 2400 baud modem.

Being able to send faxes isn't enough. There are millions of computers with modems; and there's no better way to access a database or bulletin board, download software, or transfer a file. The Zoom/Modem with Sendfax is a full-featured 2400/1200/300 bps modem with super Hayes compatibility and lots of extra features, like auto-dial/auto-answer, call progress tone detection, a quality speaker and power amplifier, telephone line impedance matching, MOV varistor lightning protection, and more. It is available in two models, the HC2400S internal and MX2400S external.

It's easy to broadcast a fax.

The Zoom/Modem's software is powerful. It lets you put people into different groups—like your sales force, top customers, suppliers, key investors, or club members—and broadcast a personalized fax to the whole group with a simple command.

It saves you time. And money.

Now you can sit at your PC and communicate with the world, without wasting time pushing

paper. And faxes are faster than Fed Ex—and, for most documents, a lot less expensive. Plus you can schedule your faxes to be sent at night, when phone rates are lowest.

With a suggested retail price under \$200, a Zoom/Modem with Sendfax is a remarkable value. You get fax capability *and* 2400 baud modem capability for less than the cost of most conventional 2400 baud modems.

It comes with great software.

Excellent hardware is not enough. You need software that makes it easy to communicate. To broadcast a fax or schedule it for transmission when rates are lowest. To transfer a file using Xmodem or one of the other popular file-transfer protocols. The Zoom/Modem with Sendfax comes with software that makes the Zoom/Modem a pleasure to own.

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CIRCLE 210 ON READER SERVICE CARD



The Zoom/Modem with Sendfax

Zoom Telephonics, Inc., 207 South St., Boston, MA 02111 800-666-6191

CONNECTIVITY STATISTICAL REPORTING



FACT FILE

Control Room,
Version 1.0
Ashton-Tate Corp.,
20101 Hamilton Ave.,
Torrance, CA 90502-
9972; (213) 329-8000.
List Price: \$129 per
workstation.

Requires: 384K RAM,
DOS 3.0 or later.

In Short: *Control Room* collects detailed
statistical reporting information on individual
computers and the entire LAN. More than just a
useful tool for customizing and configuring a PC,
it's a visually spectacular and operationally
impressive program.

CIRCLE 421 ON READER SERVICE CARD



lecting the performance test from the menu produces video-game-like beeping sounds and a flashing screen guaranteed to attract attention. The 20K TSR lets you select from a menu the types of reports you can create.

To get statistical reports showing information about the entire LAN, you first create a single batch file to survey every machine. The batch file compiles information to be placed into database-format files. This information helps you compare all node operations and activities on your LAN. You can configure the batch file to collect information for a certain time period or date.

Selecting *Control Room*'s control panel from the menu gives you access to a wide variety of information and permits many system adjustments. From the control panel, you can maximize your hard disk's execution. This feature allows you to view pertinent information and statistics about

the hard disk and set the disk cache to ensure better disk access. The program's summary panel, accessible from the same

menu as the control panel, works in conjunction with its reference library, described later.

Control Room also gives you information about your workstation's memory, such as the RAM requirements for critical files and programs, and data on cache memory, video memory, and available extended memory. *Control Room*'s Config menu makes it easy to select configuration settings and update them. You can activate or deactivate command line functions in your CONFIG.SYS and AUTOEXEC.BAT by answering simple yes/no questions. One feature in the general menu protects your workstation from viruses. It uses the relatively simple approach of alerting you when a file changes by one byte.

All reports and customization menus show up on-screen in statistical report format. If you need printed copies of the reports, a printer redirection option on the general menu can output them.

INSIDE NETWORK OPERATING SYSTEM UTILITIES

by Kimberly Maxwell

Some popular network operating systems include statistical reporting programs, enabling a LAN administrator to monitor network and file server activity. Most of these network operating system programs give a manager just enough information to avoid the need for additional software packages. Two network operating systems with utilities that produce a detailed statistical report of network and file server usage are Novell *NetWare* and Artisoft *LANtastic NOS*.

NETWARE 286 AND 386 MONITOR

Monitor, a utility included with *NetWare*, keeps track of the activities of each workstation logged in or attached to the file server. Novell continuously upgrades *NetWare*, at the same time improving the Monitor program's performance of statistical reporting tasks.

Some of the features in both the 386 and 286 version of Monitor coincide, but overall the *NetWare 386* version of Monitor lacks the abundance of statistical data that the *NetWare 286* version gives on workstations running Fconsole. Fconsole is the utility that supplies information on file activity at the server

console. LAN administrators who use the *NetWare 286* version of Monitor to report on network activity find its information invaluable. *NetWare 286* uses a six-block display; each block gives information about an individual workstation. And *NetWare 286* automatically updates the workstation information on the screen.

NetWare 386 looks much different at the server console, where generally only the administrator can access the monitor and keyboard. While the Monitor program in *NetWare 386* contains many more features than the one in *NetWare 286*, *NetWare 386*'s Fconsole utility includes fewer capabilities than its predecessor, supporting only half the menu items included in the earlier version.

The client stations can see server activity using Fconsole, but *NetWare* limits the information shown to users without supervisor rights. As an ordinary user, you can find out who is working in a file or the reason *NetWare* locked you out of a particular file. On the other hand, if you possess supervisor rights and need to shut down the system, Monitor gives you enough information to help avoid problems such as losing open files.

LANtastic STATISTICS

With Artisoft *LANtastic NOS*'s statistical program, you can display system activity and determine who is using a particular server. You simply log on and view a menu showing the users accessing a particular server. The menu gives you a snapshot of the server activity; you can update the activity every time you hit the spacebar. Within this menu of user information, you can see the station ID, user name, file usage, queues, and user access writes. *LANtastic*'s program does not supply as much detail or complexity as *NetWare*'s, but it gives enough information for the network manager or user to define server activity.

Other network operating systems on the market also include this type of LAN statistical reporting program. Like the two popular network operating systems described here, you'll find them at both the higher and lower end of the market.

A helpful hint: if you're choosing a network operating system, make sure it includes a statistical reporting program of its own. It can help you track network activity and file server status, and it may give you all the information you want to know. ■

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2 Serial and 1 Parallel Ports



286/20 \$699

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Norton SI 23.0
Landmark™ Speed 26.7MHz,
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101-Keyboards,
2 Serial and 1 Parallel Ports

PC BRAND 286's

Add the following amounts to the base configuration prices shown above

Hard Drives: MB/MS	40/25	71/25	125/15	178/15
Mono	\$480	\$595	\$770	\$1070
VGA-Mono	\$639	\$758	\$929	\$1229
VGA-Color	\$825	\$944	\$1115	\$1415
SVGA-Color*	\$960	\$1079	\$1250	\$1550

* SVGA 1024 x 768 interlaced

* Tower is a registered trademark of NCR Corp.

Standard Features:

- 80286-16, 80286-20 operating at 16MHz, or 20MHz w/ZeroWait
- 512K RAM expandable to 8MB on the System board using 256K or 1MB RAM
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- Enhanced 101-key Click/Tactile Keyboard
- 2 Serial & 1 Parallel ports
- High Capacity System Power supply
- Real Time Clock/Calendar with 5 Year Battery
- 80287 Co-Processor Support
- AMI BIOS w/full MS/DOS, OS/2, XENIX, UNIX, NOVELL, 3COM and PCNET compatibility
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-Computer Monthly, PC Brand 286

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386/SX-20 \$899

20 MHz Clock,
Zero Wait Operation
NortonSI 23.0
Landmark™ 25.3MHz,
512K RAM,
1.2MB or 1.44MB Drive,
101-KeyBoard,
2 Serial and 1 Parallel Ports

PC BRAND 386/SX's

Add the following amounts to the base configuration prices shown above

Hard Drives: MB/MS	40/25	71/25	125/19	178/15
Mono	\$480	\$599	\$770	\$1070
VGA-Mono	\$639	\$758	\$929	\$1229
VGA-Color	\$825	\$944	\$1115	\$1415
SVGA-Color*	\$980	\$1079	\$1250	\$1550

* SVGA 1024 x 768 interlaced

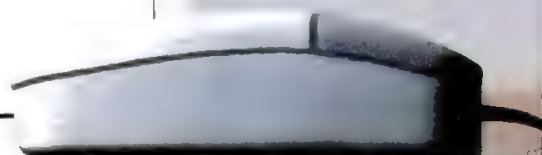
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Standard Features:

- Free On-Site Service by TRW[†]
- 80386SX Processor Operating at 16 or 20MHz delivering 18 or 22.5MHz Effective Throughput
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- FCC Class "A", Intended for business use
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- Enhanced 101-key Click/Tactile Keyboard
- 2 Serial & 1 Parallel ports
- High Capacity 200Watt System Power Supply
- Real Time Clock/Calendar with 5 Year Battery
- 80387SX Co-Processor Support
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-Computer Shopper, Cover Story

"The Best Low Cost Alternative Around!"

-PC Magazine, 25MHz 386PC's

"The Biggest Bargain In Personal Computing"

-Computer Buyer's Guide, Cover Story

386/25-\$1199

386/25 \$1199

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Norton SI 28.2
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Standard Features:

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- FCC Class "A". Intended for business use
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- Enhanced 101-key Click/Tactile Keyboard
- 2 serial & 1 parallel ports
- High Capacity 200Watt System Power Supply

- Real Time Clock/Calendar with 5 Year Battery
- 80287, 80387, or Weitek Co-Processor Support
- AMI BIOS with full MS-DOS, OS/2, XENIX, UNIX, NOVELL, 3COM compatibility
- 8 Slot motherboard design (5 16Bit & 3 8Bit)
- Medium foot print case with 6 Disk Drive bays

Options:

- Low profile Slim Line Case with 3 Disk bays
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PC BRAND 386/25

Add the following amount to the base configuration price shown above

Hard Drives MB/MS	40/25	71/25	125/19	178/15	320/16	640/15
Mono	\$480	\$599	\$770	\$1070	\$1870	\$2730
VGA-Mono	\$639	\$758	\$929	\$1229	\$2029	\$2889
VGA-Color	\$825	\$944	\$1115	\$1415	\$2215	\$3075
SVGA-Color*	\$960	\$1079	\$1250	\$1550	\$2350	\$3210

* SVGA 1024 x 768 Interlaced

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- I/O Ports-2 serial, 1 parallel

- High Capacity 200Watt System Power Supply
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PC BRAND 486's

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Mono	\$599	\$770	\$1070	\$1870	\$2730
VGA-Mono	\$758	\$929	\$1229	\$2029	\$2889
VGA-Color	\$944	\$1115	\$1415	\$2215	\$3075
SVGA-Color*	\$1079	\$1250	\$1550	\$2350	\$3210

* SVGA: 1024 x 768 interlaced

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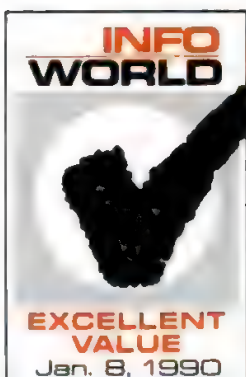
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Zero Wait Operation
Norton SI 45.9
Landmark™ 58.7MHz,
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101-KeyBoard,
2 Serial and 1 Parallel Ports

Standard Features:

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- I/O Ports-2 serial, 1 parallel
- High Capacity 200Watt System Power Supply
- Real Time Clock/Calendar with 5 Year Battery
- 80387 or Weitek CoProcessor support
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PC BRAND 386 Cache

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Hard Drives: MB/MS	40/25	71/25	125/19	178/15	320/16	640/15
Mono	\$489	\$599	\$770	\$1070	\$1870	\$2730
VGA-Mono	\$639	\$758	\$829	\$1229	\$2029	\$2889
VGA-Color	\$825	\$944	\$1115	\$1415	\$2215	\$3075
SVGA-Color*	\$960	\$1079	\$1250	\$1550	\$2350	\$3210

* SVGA 1024 x 768 interlaced

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LAN STATISTICAL REPORTING PROGRAMS: SUMMARY OF FEATURES

	BindView Plus	Control Room	Direct Net	Fresh Utilities	The Frye Utilities for Networks	LAN Command
List price	\$149 per network	\$129 per workstation	\$245 per server	\$179 per server	First server, \$495; each additional, \$150	\$395 per network
RAM						
Workstation RAM usage	300K	384K	256K	199K to load; 1.5K-5K to run	512K	0K
Terminate and stay resident	☐	☒	☐	☒	☐	☐
NETWORK						
Works only with NetWare operating system	☒	☐	☐	☒	☒	☐
Loads a VAP on the server	☐	N/A	N/A	☐	☐	☐
Loads an NLM on the server	☐	N/A	N/A	☐	☐	☐
Displays Novell bindery information	☒	N/A	N/A	☒	☒	☒
NETBIOS						
Uses NetBIOS	☐	☐	☐	☐	☐	☒
Reads NetBIOS name table	N/A	N/A	N/A	N/A	N/A	☒
Reads NetBIOS adapter status	N/A	N/A	N/A	N/A	N/A	☒
Reads NetBIOS session status	N/A	N/A	N/A	N/A	N/A	☒
INTERFACE						
Menu-driven	☒	☒	☒	☒	☒	☒
Command-line-driven	☒	☐	☐	☒	☒	☒
REPORT INFORMATION						
Automatic LAN hardware inventory	☐	☒	☐	☐	☒	☐
History/trend analysis	☐	☒	☒	☐	☒	☒
Network packet monitoring	☐	☐	☐	☒	☐	☒
Disk cache statistics	☐	☒	☐	☒	☒	☒
Disk use	☒	☒	☒	☒	☒	☒
Server performance	☐	☐	☐	☒	☒	☒
FEATURES						
On-line help	☒	☒	☐	☒	☒	☒
Maximum number of servers	8	N/A	1	Unlimited	Unlimited	Unlimited
Maximum number of workstations	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited
Shows real-time use of resources or network	☐	☐	☐	☒	☒	☒
Copy protected or serialized	☒	☒	☐	☐	☒	☐
SUPPORT						
Toll-free number	☒	☒	☒	☐	☒	☐
Offers free support	☒	☒	☒	☒	☒	☒
Offers contract support	☒	☒	☐	☐	☒	☒
Support hours (EST)	10:00-7:00	9:00-7:30	7:00-7:00	10:00-7:00	8:00-6:00	9:00-4:00

☐ — Editor's Choice ☒ — Yes ☐ — No

N/A—Not applicable: the product does not have this feature.

NARRATIVE REPORTS

The almost eerie feature of *Control Room* is its ability to tell you about your computer in narrative form. This output looks different from that of other programs using statistical charts, graphs, and numbers to illustrate their findings. The written report not only supplies information about your computer and its components but also recommends ways to make your PC perform better.

One report we generated spotted a bank

of slow RAM memory chips inserting CPU wait states into a PC with an otherwise fast CPU. The narrative not only reported the problem but went into detail explaining the ramifications for system performance. Narrative reports created by *Control Room* are grammatically correct, explicit, and helpful.

The reference library defines the more difficult words used in the reports. It covers nearly 1,000 terms dealing with the computer industry. The summary panel al-

lows you to retrieve reference information or obtain detailed track-record statistics.

Control Room is simple to master, but it contains many features. It helps you prepare to use a software application or to meet hardware trouble by giving you information about your system. And it offers more than just a statistical reporting program for each node or your entire LAN: It provides a tool to configure your workstation so that you can enjoy better performance from your machine.

CONNECTIVITY STATISTICAL REPORTING

LAN Director	LANtrack	The Lomax Utilities	LT Stat Plus	Monitrix	NetCompanion	NETreports
\$295 per server	\$595 per server	\$295 per network	\$295 per server	VAP, \$795; NLM, \$995	First server, \$349; 2-5 servers, \$650	\$295 per server
384K	200K	512K	256K	512K	320K	39K
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CONNECTIVITY

STATISTICAL REPORTING

LAN STATISTICAL REPORTING PROGRAMS: SUMMARY OF FEATURES



	Outrider	Perfect Menu	Saber File Manager	SCUA Plus	SoftBreeze	TXD	Watchdog Network Monitor
List price	\$90 per server	Single user, \$130; unlimited, \$395	\$395 per server	\$60-\$250 per workstation or server	\$250 per server	\$195 per site license	\$1,995 per network
RAM							
Workstation RAM usage	256K	384K to load; 11K resident	484K	12K	31K	640K	512K
Terminate and stay resident	☐	☐	☐	☒	Optional	☐	☒
NETWORK							
Works only with NetWare operating system	☒	☐	☐	☐	☐	☒	☐
Loads a VAP on the server	☐	N/A	N/A	N/A	N/A	☐	N/A
Loads an NLM on the server	☐	N/A	N/A	N/A	N/A	☐	N/A
Displays Novell bindery information	☒	N/A	N/A	N/A	N/A	☒	N/A
NETBIOS							
Uses NetBIOS	☐	☒	☒	☐	☐	☐	☒
Reads NetBIOS name table	N/A	☒	☐	N/A	N/A	N/A	☒
Reads NetBIOS adapter status	N/A	☒	☐	N/A	N/A	N/A	☒
Reads NetBIOS session status	N/A	☐	☐	N/A	N/A	N/A	☒
INTERFACE							
Menu-driven	☒	☒	☒	☒	☒	☒	☒
Command-line-driven	☐	☒	☒	☒	☒	☐	☐
REPORT INFORMATION							
Automatic LAN hardware inventory	☒	☒	☐	☐	☐	☒	☒
History/trend analysis	☒	☒	☐	☒	☐	☒	☒
Network packet monitoring	☐	☐	☐	☐	☐	☒	☒
Disk cache statistics	☐	☐	☐	☐	☐	☐	☐
Disk use	☒	☒	☒	☐	☒	☐	☐
Server performance	☒	☐	☐	☐	☐	☒	☐
FEATURES							
On-line help	☒	☒	☒	☒	☒	☒	☒
Maximum number of servers	4	NOS-dependent	Unlimited	Unlimited	Unlimited	Unlimited	1,024
Maximum number of workstations	N/A	NOS-dependent	Unlimited	Unlimited	Unlimited	Unlimited	1,024
Shows real-time use of resources or network	☒	☒	☒	☐	☒	☒	☒
Copy protected or serialized	☐	☐	☒	☒	☒	☐	☒
SUPPORT							
Toll-free number	☐	☒	☒	☐	☐	☒	☐
Offers free support	☒	☒	☒	☒	☒	☒	☒
Offers contract support	☐	☐	☒	☒	☒	☐	☒
Support hours (EST)	9:00-5:00	9:00-6:00	10:00-6:00	8:30-5:30	11:00-8:00	24 hours	9:00-9:00

☒—Editor's Choice

☒—Yes

☐—No

N/A—Not applicable: the product does not have this feature.

ENDS

REQUIREMENTS FOR SETUP

The *DNet* package contains an easy-to-follow supervisor manual, three user guides, and the necessary software. You install the software on the file server's hard drive and run it in each workstation. You can start the program directly from DOS or use a log-in batch file. *DNet* does not go memory resident. It runs in any PC with 256K RAM, but you need 512K RAM for the initial setup.

Installation takes only minutes; menus, however, require more time to create. En-

tering data and designing menus can be time-consuming, and if you're a supervisor, you must also dispense user or workstation IDs and application lists. You can create passwords for the system, then add another layer of passwords over them. *DNet's* levels of passwords make for a tight security system. One particular feature restricts access to DOS, but it's only partially successful since some applications that require access to the DOS command line manage to get through anyway.

We found when setting up menus that

it's best to choose words describing the application rather than including the user name. *DNet* uses the term *user name* to refer to another level of identification. *DNet* user menus can contain up to 20 selections, chosen by typing letters of the alphabet from A to T. Each selection in the main menu can lead to one level of sub-menus—a limitation that on some networks restricts your ability to create several tiers of menus. The main menu selections require only 1K RAM; the sub-menus call for a larger 27K RAM.



FACT FILE

Direct Net, Version 1.0

Fifth Generation Systems, 10049 N. Reiger Rd., Baton Rouge, LA 70809; (800) 873-4384, (504) 291-7221

List Price: \$245 per server

Requires: 256K RAM (384K RAM for usage report printing), DOS 2.0 or later.

In Short: *Direct Net* offers LAN users a simple way to avoid using the DOS command line to move through the network. Its versatile usage-tracking system helps a supervisor monitor the network's most-used applications.

CIRCLE 422 ON READER SERVICE CARD



USAGE TRACKING

A central maintenance menu helps you track activities to a log file and update individual menus; you can track users, projects, workstations, and applications all from this menu. Referring to the log helps you stay on top of system usage. *DNet* prompts users for their names and project numbers when they attempt to access applications; this aids in tracking user and usage. For the usage report, you can select a primary and secondary sort from among five sort options. *DNet* gives you a choice between detailed and summary reports that you can review on-screen or output to the printer.

In designing such a simple-to-use program, Fifth Generation Systems has created a network management tool convenient to LAN users and supervisors alike. For the LAN supervisor, *Direct Net* produces versatile usage reports that help indicate which applications individual users run most.

Fresh Utilities

by Kimberly Maxwell

Fresh Technology Group's *Fresh Utilities* gives you a refreshing batch of programs to monitor and simplify activity on your Novell network. *Fresh Utilities* sells for \$179 per server and includes a site license for unlimited users. The package includes nine utility programs you can run from the command line and an administrative program you can use for gathering reports.

The utility programs run as TSRs on

CONNECTIVITY
STATISTICAL REPORTING

each workstation on either a *NetWare* 286 or 386 network. If you load all the utilities, they only take about 5K of RAM. Each workstation utility must have access to the server, but no special program runs in the server itself.

The administrative program, a foreground application run by the network administrator, looks at server usage and LAN I/O, reports on the network's caching activity, and views the read/write bytes. This program relates the information in report format, allowing a LAN administrator to decipher network problems or inconsistencies easily.

COMMAND LINE UTILITIES

Several of the command line utilities within the package take care of network house-keeping chores. The FTLOGOUT utility automatically logs out a user. FTLOCK blanks the screen and locks the keyboard if

FRESH UTILITIES

SUITABILITY TO TASK

Novell management		3
Real-time monitoring	2	
Expenditures and growth		3
Daily administration		4

the workstation is inactive for a user-definable length of time. When this occurs, a user must type a password to resume activity on the network. FTDIRSIZ generates reports showing the space used by a particular directory's contents.

Some other utilities include FTLIGHT, a program that puts a disk access light on your screen to show server disk activity. And if you use *Fresh Utilities'* FTCOPY command instead of DOS's, you can move files and retain both DOS and *NetWare* attributes.

The FTMSGRMV program clears server messages after a given interval. If you've ever had one *DESQview* session locked up by a server message in another *DESQview* session, you can understand the value of this utility. Many people feel they don't really need to receive all the messages sent by a *NetWare* file server.

You can also see which drive letters on the local drive or the network are not being currently used by invoking the FTDRIVES utility. FTGROUPS lists the members of all the groups—as well as the



FACT FILE

Fresh Utilities, Version 2.3

Fresh Technology Group, 1478 N. Tech Blvd., #101, Gilbert, AZ 85234; (602) 497-4200.

List Price: \$179 per file server.

Requires: 199K RAM

to load, 1.5K-5K to run; supervisor or equivalent status to run ADMIN reporting utility; *NetWare* 286 2.0 or later or *NetWare* 386 3.0; DOS 2.0 or later.

In Short: *Fresh Utilities* gives *NetWare* network administrators a tool for monitoring network activity at a low price that, together with the package's low RAM requirements and easy operation, makes a difference when you shop for a LAN administration utility.

CIRCLE 423 ON READER SERVICE CARD



group names—located on the file server.

The caching information option is a nice feature that gives you an overview of the disk caching activity on the default file server. It shows detailed information about the file server's cache capabilities, such as the total number of cache buffers; bytes per cache buffer; physical reads, writes, and hits; and any errors. Savvy network administrators can use this information to fine-tune the server's disk cache operation for specific applications.

The FTBIND program displays *NetWare's* bindery objects and information, both in ASCII text for greater readability and in hexadecimal notation. FTBIND gathers information about users, print queues, and file servers, and is especially helpful for those who work with bindery objects and properties related to the bindery.

ADMINISTRATIVE REPORTING

Installation requires only a few minutes; you type ADINSTALL at the DOS prompt and answer a few questions. After installation, you can execute the program using its menu-driven interface or use the command line utilities to execute the portions of the application you need at a particular time. The *Fresh Utilities* have the look and feel of the utilities included in *NetWare*, with the same exploding menus and fine-line background screens.

The opening menu of the administration program, ADMIN, allows you to select from seven operations, with accompanying windows for each option. The program first asks you specific questions about your network, the users on it, and

Compaq has *one* spec



Compaq DeskPro 486/25, Model 120

Check the reviews. You'll find that the Tandon 486/25 Desktop and Tandon Tower 486 computers match anything Compaq® can offer.

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The Tandon 486/25's next-generation performance goes for a mere \$6,999; the more expandable Tower 486, just \$7,399. And both systems include VGA monitors, generous memory, and mass storage capacity (see below for specifics).

Which makes the \$12,499* for a Compaq DeskPro™ 486/25, well, embarrassing. Especially if you need to justify the extra

\$5,000 cost to budget-balancing higher-ups.

With Tandon, you actually get what you pay for. For starters, we begin with everything that makes a 486 a 486. Including 32-bit EISA bus technology to move information using the new high-performance peripherals designed especially for 486 computers.

Then we add enough proprietary hardware to move *PC Computing* to call the Tandon 486/25 "a hot ticket for performance junkies." Like our exclusive Memory Mapper, which shadows the ROM instructions into faster RAM. The Tandon

STANDARD FEATURES • Tandon 486/25 and Tandon Tower 486/25. • Intel® 80486™ processor running at 8 or 25 MHz, keyboard selectable. • Tandon's Power Poster speeds write performance with burst transfers at a capacity of eight 32-bit words. The MultiCACHE is an external, zero-wait state, 64KB static RAM cache. Main board accepts a Weitek™ 4167 co-processor to coexist with the built-in 80486 math co-processor. • Built-in single screen system setup utility automatically configures diskette drives, memory expansion, serial and parallel options; allows easy selection of security levels, hard drive mapping, and routine functions such as date, time, language, etc. • 4MB 64-bit RAM, expandable to 64MB. •

Two RS-232-C serial ports; one IBM®-compatible bidirectional parallel port. • Six 32-bit EISA slots (can accept IBM AT™-compatible adapter cards); two 16-bit AT-compatible slots. • 3.5-inch high-density, double-sided 1.44MB diskette drive or 5.25-inch 1.2MB diskette drive. (Both included with Tandon Tower 486.) • 200MB IDE hard drive. • Built-in speaker with programmable, IBM-compatible sound. • 14-inch VGA™ monochrome display; 16-bit VGA adapter with 256KB RAM, expandable to 512KB. • Universal 101-key enhanced layout keyboard, low profile with 12 function keys, LED indicators for Num Lock, Caps Lock, and Scroll Lock Keys, password security. • Tandon 486/25: Five half-height drive

we'll never equal: Price.



Tandon 486/25 Desktop

PowerPoster™ which intelligently bursts write operations onto RAM so you can access information more quickly. And Tandon's Advanced Memory Management architecture, which doubles data transfer speed by sending it over a 64-bit data path.

So hang on to your hat—this is one fast 486.

To complement the Tandon 486 and Tandon Tower 486 as network file servers, consider the ultra slimline Tandon 386sx/N and 286/N workstations. At \$1,199 and \$949 respectively, they'll work pretty well with your budget, too.

Whichever Tandon system you choose, there are several fea-

bays, three accessible. Tandon Tower 486: Eight half-height drive bays, six accessible. • 230 watt, fan-cooled power supply (250 watts on Tandon Tower 486), switchable to 115 or 230 volts. • Tandon 486/25: 21.1 inches wide by 16.3 inches deep by 6.3 inches high. Weight: 399 lbs. Tandon Tower 486: 10.2 inches wide by 19.6 inches deep by 26.1 inches high. Weight: 70 lbs. • Base configuration features: System unit, 200MB IDE hard drive, VGA monochrome monitor, 16-bit VGA adapter, keyboard, power cord, operation and installation manual, Tandon MS-DOS software and manual, Microsoft® Windows™ 3.0, and serial mouse. • **UPGRADE OPTIONS:** 2MB and 8MB memory upgrade kits (to 64MB); 330MB,

tures we'll always include: outstanding Tandon sales and support staff; helpful, knowledgeable, no-pressure assistance; prompt delivery; one-year limited warranty; on-site service; and a no-exceptions 30-day money-back guarantee.

So call now and find out more about the Tandon 486/25 Desktop and Tandon Tower 486; computers that measure up to Compaq in performance. Not price.

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FAX: 805-529-8408

Tandon
Where it pays to be direct

CIRCLE 508 ON READER SERVICE CARD

600MB, and 1GB SCSI hard disk drives; 650MB ISO-approved optical drive and cartridge; VGA and Super VGA color monitors; graphics accelerator card; 2400 baud modems; network cards; laser printers. • Tandon reserves the right to amend specifications without notice. Tandon 486/25, Tandon Tower 486, MultiCACHE and PowerPoster are trademarks of Tandon Corporation. All other products or services are identified by the trademarks or service marks of their respective companies. © 1990, Tandon Corporation, 301 Science Drive, Moorpark, CA 93021. * List price for the Compaq DeskPro 486/25, Model 120, published by HardFacts™, Beverly, MA.

file information. These setup tasks are crucial to the program's monitoring capabilities. Once you include the information, you can retrieve reports or print information without leaving the program. ADMIN produces well-organized, easy-to-follow reports.

The *Fresh Utilities* allow you to look at the server you are attached to, the default server, and any other servers available. You can detach from a server with a simple command. A useful feature included in the server information window supplies detailed information about the default server while continuing to monitor your network activity. It can generate a report on server memory, server connections, and bindery information, as well as show an administrator the maximum number of files allowed in the bindery and the number of bindery files used. *NetWare* administrators who want to fine-tune their server's performance will find this feature useful. An excessively large bindery slows down the server's operation, and if the server reaches the maximum file limit set up for the bindery, it can die.

Be aware, however, that when you monitor network activity with the ADMIN utility in this way, you read the bindery of the subject server about once a second. While this isn't a substantial load on the network or the server, you should keep in mind that it is an extra burden.

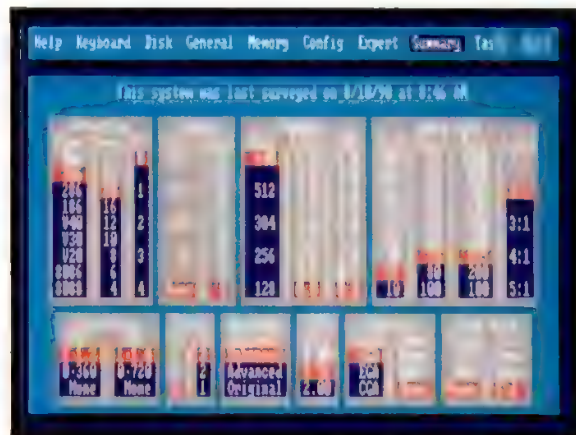
The User Information option gives detailed information about each individual using the network, including the user's account, disk usage, and the type of security equivalence granted to the user. You can view the files a user has open and access a trustee assignments listing that reports the rights a specific user has to a subdirectory. You can retrieve similar detailed information about user groups. We found this information valuable when trying to solve problems such as why certain people couldn't access specific applications. Examining a user's access rights can often explain why an application doesn't work.

Fresh Utilities proves to be a valuable but inexpensive and wide-ranging LAN administration utility. Its manual and on-line help aptly assist with program operation. Every *NetWare* administrator will find things to like in this package. Fresh Technology Group recently released another program, *NetVision*, that specializes in statistical reporting. It can monitor a Novell network in real time or in a specified time frame, but it was not ready in time for this review.

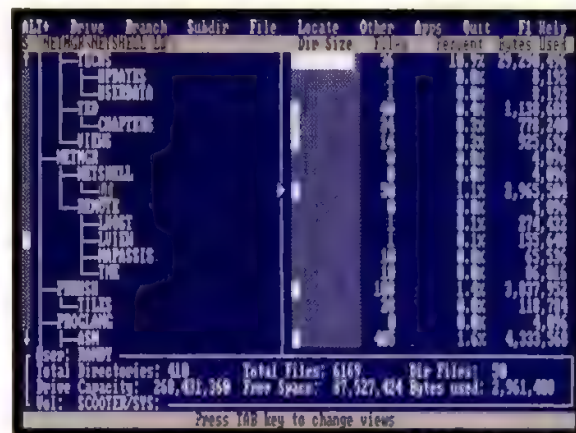
STATISTICAL REPORTING PROGRAMS AT WORK

Statistical reporting programs monitor network usage and supply detailed information about network activity. Careful analysis of the data can help LAN administrators determine ways to optimize network performance and find potential trouble spots. Using graphs and figures that show such areas as disk usage, file accesses, program execution, and packet traffic, the programs present an overview of LAN behavior that helps a manager better understand the network's changing characteristics. These screen shots, made from the packages selected as Editor's Choice or honorable mention, show some of the ways statistical reporting programs record network events.

Many of these reporting programs offer different perspectives on network activity. *Control Room* focuses on individual workstations, while *LAN Director* concentrates on the server. *Monitrix* and *Watchdog Network Monitor* offer detailed views of packet activity across stations. *Perfect Menu* gives the LAN administrator a way to track users and the projects and resources they are involved with. *Outrider* lets network managers determine immediately the health of up to four file servers from a single screen display.



The summary panel in Ashton-Tate's *Control Room* furnishes each workstation with system diagnostics, classifying activities according to processor, coprocessor, memory, hard disk, and ports. It makes the administrator's job easier by enabling the network users themselves to answer questions about their workstation's configuration.



Athena Software's *LAN Director* directory statistics view displays a bar graph and a numerical analysis showing how much space each directory in a server's tree structure uses compared with the largest directory on the volume. This comparison helps LAN administrators detect overstuffed or underused directories quickly. By removing unnecessary subdirectories, the administrator can open up disk space on the server.

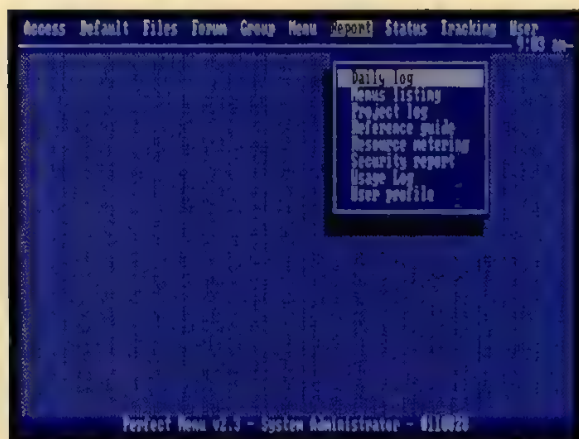
CONNECTIVITY STATISTICAL REPORTING



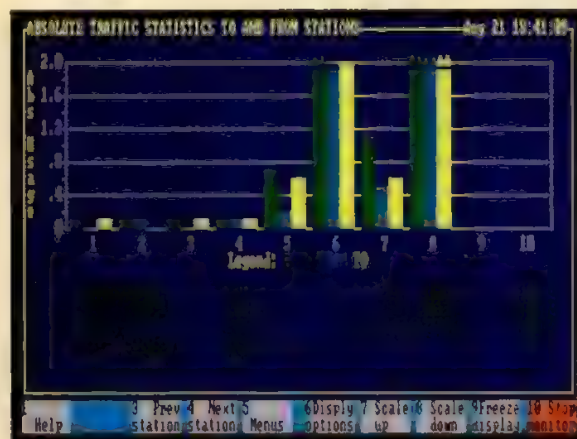
The communications statistics menu on Cheyenne Software's *Monitrix* includes an overview option that displays bar graphs and number values depicting the activity of transmit and receive packets. For a workstation, this option shows statistics for its shell, IPX, and LAN driver components. An Editor's Choice selection, *Monitrix* can also generate an overview of the file server and bridge.



Red, yellow, and green lights on the Daystrom Data Products *Outsider* screen tell the LAN administrator the status of network traffic at a glance. In the left column, CPU use on the Scooter file server and on another server both get green lights. Below, the user-defined sensor for file activity indicates a yellow alert condition, while the messages sensor block has dropped to an even more serious red alert threshold. Fax transmission, however, appears to be running smoothly.



Perfect Menu, from International Computer Group, offers the LAN administrator a varied selection of reports for analyzing network activity. From one menu, the administrator can select a daily log of information on users and resources or access a listing of each user's menu setup information. A project log gathers project tracking information, while resource metering keeps track of resources allocated to projects. The on-line reference guide offers over 80K of help information. A usage log records timed information on all listed users, and a security report helps ensure that no one tampers with privileged information. The user profile report prints general information about ID, name, date, and time last used.



Network General's hardware/software combination, *Watchdog Network Monitor*, collects statistics on individual workstations or the entire network, including up to 1,024 nodes. An Editor's Choice selection, *Watchdog* generally displays its detailed information both numerically and in bar chart form. This screen shows traffic statistics to and from stations. The upper half graphs absolute usage for each station; the bottom half displays percentage statistics for each station based on the combination of to-and-fro activity.

CONNECTIVITY STATISTICAL REPORTING

The Frye Utilities for Networks

by Kimberly Maxwell

Don't lose hope if a major failure occurs with your existing *NetWare* network. If you use *The Frye Utilities for Networks*, you can record up-to-date, detailed information about your *NetWare* servers and network before a problem happens. The \$495 LAN management application from Frye Computer Systems also lets you create on-screen marching histograms of network activity that can help reassure you about network and, indirectly, organizational performance. To run *The Frye Utilities*, however, you must have a *NetWare* console operator's security clearance and 512K RAM available on the workstation on which you install it.

If you have more than one server on your network, you can purchase additional

THE FRYE UTILITIES FOR NETWORKS

SUITABILITY TO TASK

Novell management	3
Real-time monitoring	3
Expenditure and growth	3
Daily administration	3

server licenses for \$150. With multiple server licenses you can switch from one server to another on your network, capturing data about each server for a comparative analysis.

COMPLEX MAKEUP

The Frye Utilities is somewhat complex in makeup. The package includes 12 modules and several standalone utilities. You install the program files in a workstation designated as the administration station. The application gives real-time information telling you about your network's server usage, connections, users—as well as user groups—and their rights, log-in scripts, cache statistics, and a lot more. The *Frye* manual helps adequately with installation, and a large portion of the documentation provides sample reports. It also explains the menu system used to collect and view data gathered by *Frye*.

You can collect an abundance of information with the 12 modules in the pack-

age. Afterwards, you can send the reports to your screen, a printer, or a file for review. If you have a large report, *The Frye Utilities* signals you that it will take several more minutes to print and report.

If you want a report that consolidates much of the information from multiple reports, the Comprehensive Configuration report, found in the Configuration module, can help. You can retrieve information about each network server and about important configuration details set during the network installation process. If you need to find out about changes in the network, simply rerun the report and retrieve the updated system information. The package even reports such esoteric information as the interrupts used by the hard disks in the server.

MODULES AND UTILITIES

A separate Reports module allows you to run a weekly system maintenance report for comparing prior network performance with current information. If the report identifies an error, you can address the problem before the failure occurs.

The Server Utilization graph in the Server General submodule lets you retrieve information about disk space used on the server if you feel that the server is being overextended. The submodule will give you this information in comparative numeric values and depict the preceding 30 seconds of activity in a real-time histogram. You can review information on such server usage variables as open files, bindery objects, and server packets.

If you need information about server resources, a report in the Server Resources submodule shows how close your server is to the limits imposed by *NetWare*. *NetWare*'s design sets some of those limits, and you select others during network generation when you set up *NetWare*. With *Frye*, you can retrieve reports on as many servers as the software license permits, allowing you to compare usage and activity information within each server.

NetWare contains some utilities similar to those found in *The Frye Utilities* but without the same flexibility on the administrator's end. For example, *NetWare*'s Fconsole offers information on one user at a time, whereas *Frye* enables you to view up to 16 users. *NetWare*'s SYSCON gives you information on how an existing network is set up, while *Frye* reports the number of LAN cards installed and how the

FACT FILE



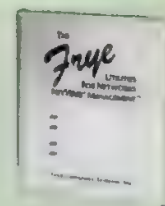
The Frye Utilities for Networks, Version 1.0
Frye Computer Systems Inc., 200 Clarendon St., Boston, MA 02116; (617) 247-2300

List Price: \$495 for first server, \$150 for each additional server.

Requires: 512K RAM; console operator or equivalent status; *NetWare* 286 2.1 or later; DOS 2.0 or later.

In Short: With its simple menus, detailed reports and bar graphs, and straightforward installation, *The Frye Utilities* makes LAN management look easy. The reports are complex but easy to follow and uncluttered.

CIRCLE 424 ON READER SERVICE CARD



user accounts were created. The main difference between *NetWare* utilities and *The Frye Utilities* is that *Frye* does not allow users to alter server information or user account data, yet it permits the LAN administrator to see the data. If you're the administrator, *Frye* also gives you the ability to freeze or unfreeze the screen so you can view the status of your network at any moment.

The Frye Utilities for Networks offers a LAN administration tool for managers seeking detailed information about network usage and resources. Until you run *The Frye Utilities*, your *NetWare* server will never have so much information gathered about it. The package can find a server's limits, usage, and resources and produce the kinds of reports it would normally take several types of LAN management applications to generate.

LAN Command

by R. Dennis Boatner

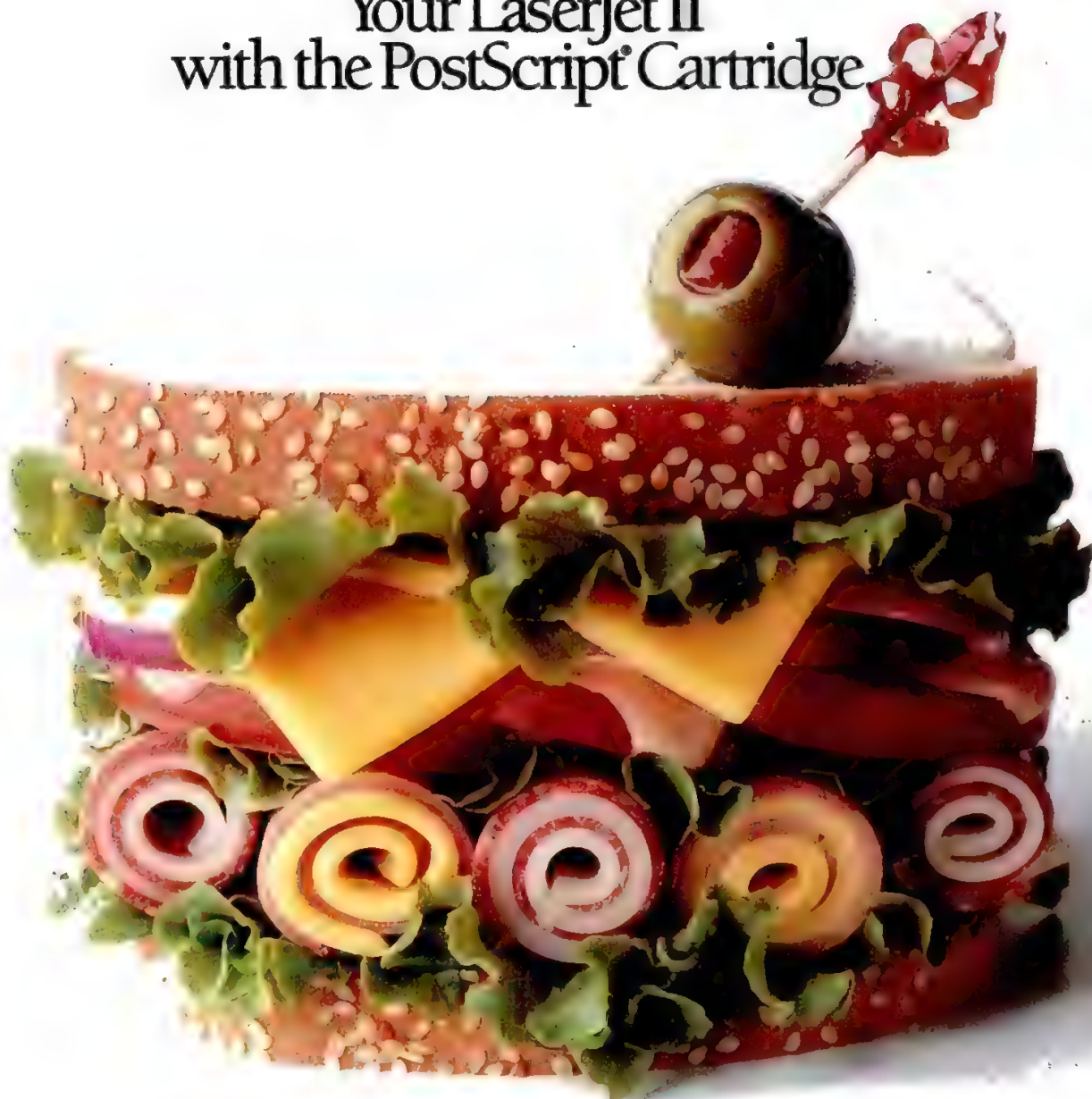
Solving the everyday difficulties of operating and maintaining a LAN is no easy task. Problems like file server failures, slow response time, and hardware malfunctions challenge the ability of any administrator to keep a network continually running. To help with this job, *LAN Command* from Dolphin Software handles network diagnostics without resorting to the complex packet decoding of protocol analyzers. *LAN Command* also includes a relational database management system to keep track of network information. It uses 260K

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CONNECTIVITY STATISTICAL REPORTING

RAM on the workstation. Priced at \$395 for each server, the program falls approximately into the midrange of the LAN management tools we review.

Unlike most products reviewed here, *LAN Command* doesn't aim solely for the *NetWare* market. It handles LAN management primarily on NetBIOS-based systems. However, *LAN Command* will also

LAN COMMAND		
SUITABILITY TO TASK		
Novell management		3
Real-time monitoring	2	
Expenditure and growth		3
Daily administration		3

function on *NetWare* systems emulating NetBIOS, and Dolphin Software recently started shipping a version that will work with Novell's IPX protocol (although it wasn't ready in time for our review).

ACTIVE MANAGEMENT

LAN Command uses proactive management to provide comprehensive reporting on multiple network operating systems. This technique involves polling each workstation and isolating problems before they become disastrous. In its unique way, the program takes an active approach, working hand-in-hand with other stations or the server rather than waiting and listening for the network traffic. If you're a LAN administrator, this gives you a better understanding of the conditions and problems as they occur.

LAN Command monitors every workstation, router, bridge, server, and gateway on the network. The monitoring functions generate charts and real-time graphs while automatically updating the database fields. You can also test and measure the performance of the network with the diagnostic tools. If a problem occurs, *LAN Command* offers several ways to solve it in easy-to-read text format.

If a node fails, *LAN Command* not only tells you what kind of PC the node is, but also the network card, IRQ number, I/O address, and office location, along with 60 additional fields of information. You can update the records by name, address, node name, location, and so on. Eight report types come with the software; you can custom design additional reports using the build-and-print custom report utility.

LAN Command supports multiple network operating systems in the same envi-

ronment. It also allows considerable flexibility for troubleshooting workstations. From the administrator's platform you can perform remote diagnostics on the workstation, check for cable faults, view the station's screen to provide remote support, send e-mail to the user, and, should the need arise, completely reboot the station.

LAN Command also supports existing X.25, async, bridged, or routed connections. Its sophisticated monitoring and benchmark tools allow you to carry out cable analysis and fault isolation as well as calculate round trip times. It can also test virtual drive performance either on the file server or node-to-node on any network topology for which you feed it information. Other *LAN Command* tools allow you to fine-tune workstations, servers, gateways, and bridges to achieve maximum performance. Application programmers can use traffic generators to test how their applications work over a network and study the effects of induced loads of activity.

The program combines protocol analyzer design principles with proactive real-time management of the networks. By



FACT FILE

LAN Command, Version 1.1
Dolphin Software, 6050
Peachtree Pkwy., #340-
208, Norcross, GA
30092. (404) 339-7877.
List Price: \$395 per
network.

Requires: 260K RAM,
NetBIOS or IPX interface, DOS 3.1 or later. Hard
disk and color monitor recommended

In Short: Although *LAN Command* takes a lot of
effort to set up, it works as a powerful relational
database that uses artificial intelligence to give
you an up-to-date picture of your network. The
program takes an active part in polling
workstations and searches for potential trouble
spots before they can cause any harm.

CIRCLE 426 ON READER SERVICE CARD

monitoring packet activity for each node, it can create an overall picture of your LAN. *LAN Command* supports up to 25,000 devices and automatically detects different LAN software and hardware.

STODGY SETUP

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CONNECTIVITY STATISTICAL REPORTING

configuring all the database information takes further work. The program would be friendlier if it automatically input information like the user name, I/O address, node name, and so on into its database. This version, while created for NetBIOS, seems to turn a deaf ear to much of the information already available to NetBIOS. Since the setup routine reads some limited default information for the database but does not talk to the rest of the NetBIOS interface, setup and configuration require extensive input from the LAN administrator. We found that to use the power of *LAN Command* properly, you must answer over 60 fields of information in the database. One way to speed things up, however, is to let *LAN Command* establish a database of user information when you start up the program.

If you have problems, Dolphin Software supplies technical support free of charge for 30 days on condition that you register the program within five days. It also offers additional support contracts for after the 30-day period.

LAN Command provides an excellent network relational database, a user menu program, e-mail, the ability to test and monitor your LAN system, and a complete set of LAN management tools. However, installing and configuring a *LAN Command* database is a formidable task that could benefit from more automation through a better interface to NetBIOS.

LAN Director

by Kimberly Maxwell

A stage play needs actors, props, choreography, and management from the director. The resources on Novell *NetWare* networks need management too. Athena Software offers a solution. Its information management system, *LAN Director*, contains many useful tools you can install on a server to direct and manage your LAN successfully. It lets you direct a LAN of epic proportions, with support for 32,000 files and over 3,000 directories per volume.

LAN Director sells for \$295 per server, with \$100 for each additional server license you purchase. It can run on any Novell network including *NetWare 386*. *LAN Director* lets you access up to 12 servers; each can have up to 26 logically mapped drives. You must install the software on the *NetWare* server's hard drive, but you

can run the program from any workstation on the network. On the server, it requires 384K RAM.

If you're a LAN administrator, *LAN Director*'s tree-like graphic interface lets you manage and organize server directories. You can change the default view so

LAN DIRECTOR SUITABILITY TO TASK			
Novell management			4
Real-time monitoring			4
Expenditures and growth	3		
Daily administration			4

that the one you create appears the next time you start. *Director*'s pull-down menus are also definable. They provide access to network management tools and on-line *NetWare* utilities like SYSCON, Fconsole, and Pconsole. These access tools can make *Director* the focal point for directing and managing a network, letting it function as a window between Novell's operating system and other LAN utilities.

NETWORK USER RIGHTS

Director allows people other than the supervisor to use the software, but the LAN administrator still sets the user rights, including manipulating branches, directories, and files. Each person must have his or her own *Director* data directory for information storage. The directory can be on a server, local hard disk, or local RAM disk.

Unlike similar products, *Director* helps network users handle standard management tasks; copying, moving, editing, and browsing become simple jobs. Even well-organized directories sometimes do not give enough information; with *Director*, you can write notes annotating a specific directory and even use high-order ASCII characters within your notes. As you scroll through the tree directory structure, the program displays your comments on the right of the screen.

With *Director*, it's easy to find duplicate filenames on the entire volume using a global search. You can also set parameters for specific files. Editing tools like tagging, wildcards, and inverting are available to help make server directories more efficient.

The searching utility offers 11 types of searches. These are similar to the ones

found in other LAN management utilities, but *Director* also lets you find files within a specified range of kilobytes or with special attributes like hidden and read-only; or you can do four types of date searches. Furthermore, you can collect detailed statistical information about each directory, including the number of files, the percentage of use, and the bytes used.

FILE EFFICIENCY

LAN Director's most unusual feature combines numerical analysis with a bar graph. Because of the cluster size limitations on hard disk drives, some files rob the drive of available space. *LAN Director* uses numerical analysis to gauge their efficiency, then depicts the results in a bar graph. There isn't much you can do with an inefficient file except delete it or combine it with other files, but you might find whole categories of files that would fit better on a different network or local hard disk drive.

A phantom directory within *Director* helps avoid a possible overload of duplicate files. Phantom directories are similar to virtual directories. You search for files according to the criteria you set. *Director* then compiles a single phantom directory containing the files from all over the drive that meet your criteria. You can then do standard file functions with the phantom files, manually creating them without doing a special search. You can also manipulate your entire list of files with wildcards like a standard directory, even though the files inside it are scattered throughout the volume.

LAN Director's noncomplex system, multicolor display, and alluring graphical



FACT FILE

LAN Director, Version 1.0
Athena Software, 4915
Twin Lakes Rd., #19,
Boulder, CO 80301;
(303) 530-0693.
List Price: \$295 per
server, \$100 per
additional site license.
Requires: 384K RAM; PC, XT, AT, PS/2, or
compatible; hard disk on server; *NetWare* 2.0 or
later or *NetWare* 386; DOS 3.1 or later.
In Short: *LAN Director*'s tree structures simplify
access to directones, and its detailed file-
directory descriptions can help define directory
contents. *LAN Director* is a useful file server
management tool to help Novell LAN
administrators organize server files and
directones.

CIRCLE 426 ON READER SERVICE CARD

interface can be enjoyable to use. It serves as a friendly, intuitive management tool to help LAN administrators organize a server's files in a significant order and edit unnecessary directories from the LAN.

LANtrack

by Kimberly Maxwell

Network Management Inc.'s *LANtrack*, a real-time *NetWare* server monitoring utility, alerts network managers to potential problems with a server. With its ability to prevent bottlenecks and network problems before they happen, the package's \$595 price tag could be worth the investment.

LANTRACK SUITABILITY TO TASK		
Novell management	3	
Real-time monitoring	2	
Expenditures and growth	2	
Daily administration	3	

The package requires you to set threshold levels on each server so that *LANtrack* can warn you when network conditions come close to a critical threshold level.

LANTRACK.EXE runs on a workstation with at least 512K RAM, taking up a minimum of 200K of that space, and handles the installation of the value added process, or VAP, on the servers you choose. If you try to copy the VAP directly to the Novell SYS:SYSTEM directory of a server, you will see an error message stating it cannot open the TRK\$LOG file. The VAP itself occupies 32K RAM on each server on which you install it. To run the program from a workstation you must have supervisor rights or the equivalent on the server station that has the VAP installed.

CONFIGURING SERVER THRESHOLDS

You can install *LANtrack*'s VAP in more than one *NetWare* 286 server, but you must configure the information for each server separately. You use the program's simple menu-driven interface to set up thresholds and test how the server executes under certain conditions. While configuring the VAP on each server, you must set the warning and critical thresholds for each item you want to track. For example, you can track high server usage and low cache performance if you set a threshold for

CONNECTIVITY STATISTICAL REPORTING

each. You can also check for file system, I/O, transaction, printer execution, and system errors. *LANtrack* will also alert you to low disk space, limited available directory entries, and a high number of LAN I/O and physical disk errors.

Running *LANTRACK.EXE* calls up a maintenance menu that includes a list of items for the VAP to check. You can add items to the list, turn off tracked items, and edit the thresholds (also known as *tracking status*) for each item. A VAP status screen checks the VAP every 5 seconds, showing the status of the message log and the data file. These two files store information about events and keep track of constantly changing network data respectively. A separate window displays trackable information in percentages, using a bar graph.

After setting up the VAP, you save the configuration in the server, turn off the server, then bring it back on-line; this makes the VAP active. If you need to change the server configuration once you set it up, a selection on the general menu allows you to do it.

Once you finish with initial installation,



FACT FILE

LANtrack, Version 1.0
Network Management
Inc., 19 Rector St., New
York, NY 10006; (800)
526-8737, (212) 797-
3800.

List Price: \$595 per
server.

Requires: 200K RAM
on workstation, 32K RAM on server; *NetWare*
286 2.10 or later; DOS 3.1 or later.

In Short: *LANtrack* proves to be a useful
reporting tool with statistics helpful to any
NetWare 286 LAN administrator. Setting server
thresholds during installation of the tracking
software helps ensure continuously smooth
operation of a *NetWare* server.

CIRCLE 427 ON READER SERVICE CARD



LANtrack is simple to use. If you run into problems, the manual assists with short and concise explanations. Network Management also provides free technical support to *LANtrack* purchasers.

EARLY WARNING SYSTEM

LANtrack offers many features that help you avoid future trouble. You can call up information about the server's status while

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CONNECTIVITY STATISTICAL REPORTING

it tracks server performance. *LANtrack* will monitor a server's usage and give you an alert message if it finds a potential problem. It decides when to alert you and sends you a warning message. You can even tell it how many times it should send you its warnings before you should respond.

LANtrack also can alert you to file allocation table errors so you can back up the drive before downing your server. To back up your system, you can use another Network Management product, *LANshadow*. *LANshadow* for a single server retails for \$695; the multiserver version, for \$1,295. The product's multiple-server support can assist network administrators in charge of larger LANs.

LANtrack is capable of multifaceted reporting and can perform a statistical analysis of your network server. It helps find problems before they occur and keeps information on your network server up to date.

The Lomax Utilities

by R. Dennis Boatner

The Lomax Utilities, a \$295 set of 19 network management reporting programs from J.A. Lomax Associates, gives you the ability to view in just a matter of minutes information that once seemed impossible to get or took many hours to compile. Enhanced with many useful and easy-to-use features, the utility program makes *NetWare* LAN management a whole lot

THE LOMAX UTILITIES		
SUITABILITY TO TASK		
Novell management	3	
Real-time monitoring	3	
Expenditures and growth	3	
Daily administration	3	

easier, consolidating critical information into 19 concise reports that give you clear control of disk usage, system security, and Novell audit and accounting trails.

Lomax is not copy protected and it won't go memory resident after you run it. You should have at least 512K of RAM in your workstation, however. To select reporting options, you use an on-line point-and-shoot interface similar to Novell's *SYSCON* and *FILER* interface. *Lomax*

generates its reports in ASCII format, and a batch file allows you to produce your reports automatically.

Though it's simple to install, you need to be careful to avoid copying *Lomax* to the same directory where Novell's *SYSCON* and *FILER* files reside. *Lomax* uses the C-Worthy Library from Custom Design Systems, and the library's *IBMSRUN* and *\$RUN* files resemble *SYSCON* and *FILER* so much that the files could conflict.

DISK MANAGEMENT AND SYSTEM SECURITY

The *Lomax* package breaks reports down into three separate areas: disk management, system security, and audit trails. In the disk management area, you can choose the *NDISK* report to give you a general overview of statistics for your network volumes and subdirectories. *NSPAC* shows the network volume by user and generates a one-line summary of space by user and volume. *NFILE* gives network subdirectory and file statistics. Novell's *IPX/SPX* and *Shell/VAP Shell* maintain all the statistics necessary to allow *The Lomax Utilities* to report on all applicable network operations.

Seven reports make up the system security section. *NUSER* provides you with a list of network users and groups, their access privileges, which groups contain which users, and all the security equivalences with which users are entrusted. *NDIR* shows network subdirectories; it lists which trustees have more privileges than regular users and what their access rights are. *NSET* holds the scripts for users' log-in procedures. The network user security report (*NSECU*) allows you to tighten user security restrictions and change the hours of the day within which users can log in. The network server security report (*HSECS*) contains a list of these enhanced security and log-in time defaults.

A section on network user accounting security contains a module called *NACCTU* that monitors the balances, credit limit, and available credit for users by relying on the enhanced user accounting features offered by *NetWare* 2.1. The same section includes the utility *NACCTS*, whose primary function is to report connect time, blocks read, blocks written, disk blocks stored, and any service requests.

AUDIT TRAILS

NAUDITR contains five network audit trail reports covering connect time and server requests, station activity, user log-in and log-out, bytes read and written by the user, and the time the server is running. The network user list report is a simple users name list that includes both the log-in ID and full name. The final report in this



FACT FILE

The Lomax Utilities, Version 2.1
J. A. Lomax Associates,
659 Adrienne St., #101,
Novato, CA 94945;
(800) 22-LOMAX, (415)
892-9606.
List Price: \$295 per network.
Requires: 512K RAM per workstation; *Advanced NetWare* 2.86 1.0 or later (2.1 or later for some accounting features); DOS 3.0 or later.
In Short: *The Lomax Utilities* package is easy to use and to install. It gives the LAN administrator enough tools to manage and control a Novell network and proves a good value. The package offers 19 types of reports on disk management, system and user accounting security, and audit trails.

CIRCLE 428 ON READER SERVICE CARD

area, *NGROUP*, produces a list of groups and their members, including each member's log-in ID and full name.

The Lomax Utilities supplies an easy way to control and manage a Novell network. Its set of network tools is right on the mark from a pricing standpoint and gives a LAN administrator the kind of reporting that's vital to effective network performance. To top off a great value, J.A. Lomax Associates offers free telephone support.

LT Stat Plus

by R. Dennis Boatner

Early on, most LAN administrators need to consider management of system configuration and disk utilization. Blue Lance's *LT Stat Plus*, priced at \$295 per file server, gives Novell network managers an effective tool to handle these areas. This program works hand-in-hand with Blue Lance's *LT Auditor* (see "Building Workgroup Solutions: LAN Metering Software," *PC Magazine*, September 11, 1990) and provides comprehensive reporting of your LAN activity.

LT Stat Plus supplies ready-to-use and easy-to-read statistical information. Anyone installing, managing, or supporting a LAN must rely on the system documentation, and *LT Stat* furnishes accurate, detailed documentation on system configuration, disk use, and server performance. It gets its data by reading Novell's bindery information.

Novell's SYSCON utility is an excellent interface that an administrator can use to modify users' rights, group membership, and other related areas, but it can't print reports. This reporting capability is

LT STAT PLUS		
SUITABILITY TO TASK		
Novell management		3
Real-time monitoring	2	
Expenditure and growth		3
Daily administration		3

available within *LT Stat Plus*, not only complementing SYSCON but enhancing your LAN management system.

LT Stat Plus competes most directly with the ADMIN portion of the *Fresh Utilities* program from the Fresh Technology Group. We found *LT Stat Plus* significantly faster when we asked for certain reports, particularly on trustee assignments. However, *LT Stat Plus* doesn't work nearly as flexibly as ADMIN in a multiserver environment.

INSTALLATION AND REPORT OPTIONS

Once you log onto the network and make sure the current drive maps to the correct server, the installation procedure functions easily and automatically. It requires that a minimum of 256K of RAM be present. *LT Stat Plus* includes an added feature in the installation procedure allowing you to place the program on any volume or directory. It contains both a menu-driven interface using function keys and a command line interface that accepts input directly from the DOS prompt. The command line interface gives you the ability to create, view, print, and save reports without going into the program. You can also create batch files to run *LT Stat Plus*, so that even someone with little training can order the program to generate complex reports.

The main menu includes two new report options. The first, a server performance report, reports cache, channel, disk mapping, and directory and file statistics. Connection information, file system statis-

CONNECTIVITY STATISTICAL REPORTING

tics, LAN input and output statistics, transaction statistics (such as how many times a file has been accessed or packets transferred between different locations), and summary and volume information are also available. The second report offers a user wish list. This gives individual users a way to suggest how they want their personal system to be set up.

LT Stat Plus now contains seven new reports in the accounting subsection of the Configuration and Security section. The Account Balance and Restrictions report and six other reports supply information to make managing your LAN easier. The package now includes an error log to monitor operational problems.

We ran into one interesting situation when we tried to create reports using *LT Stat Plus*. The program checked the server's hard drive and discovered that we had only about 2MB left. It popped up a message informing us that it needed at least 3MB of space to build its data file. Thanks to the smart programmer who wrote this check into the code, the function didn't simply jump in and fail.



FACT FILE

LT Stat Plus, Version 2.1
Blue Lance, P.O. Box 430546, Houston, TX 77243; (713) 680-1187.
List Price: \$295 per file server.
Requires: 256K RAM per workstation, 3MB RAM for certain reports; NetWare 2.1 or later; DOS 2.0 or later.
In Short: Specifically designed for NetWare, *LT Stat Plus* is a LAN management tool that's both easy to use and complete in its reporting capabilities. Friendly and with a familiar interface for NetWare managers, it makes LAN administration less of a headache.

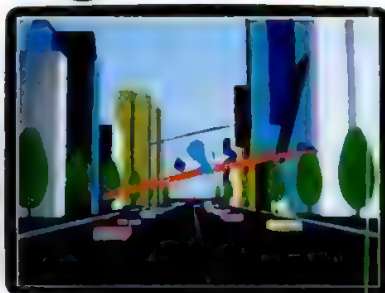
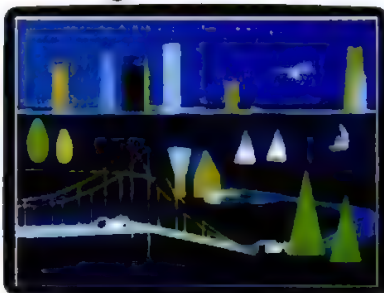
CIRCLE 429 ON READER SERVICE CARD

NOVELL-STYLE UTILITIES

Two additional utilities come with *LT Stat Plus*: Convert and the print user's manual. These allow you to convert old *LT Stat* files and new *LT Stat Plus* files to ASCII format and give you the ability to print help texts for each kind of file.

Operating *LT Stat Plus* is simple; the same interfaces, exploding screens, and fine-line background that you find in No-

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MAG Computronic PMV14VC Plus

by Alfred Poor

One of the great advantages of PC Magazine's reviews is that they go beyond just the few "big name" products and include every relevant consideration. While this often produces just another thorough investigation that includes many "me-too" name machines or programs, we sometimes uncover some real finds. One of the MAG Computronic PMV14VC Plus color monitor is one of them.

The PMV14VC Plus can display up to 1024x768 resolution in an 8514/A-compatible interlaced mode. It also carries the impressively low list price of \$495.

The price is only part of the monitor's attraction. The image it displays is quite

smooth and crisp. Part of the quality may be a result of its fine dot pitch (0.28 mm), but that can only be part of the story.

The image on our test machine appeared to have no areas of serious misconvergence—the white lines of our test image were consistently white, without colored halos even in the corners. The pin-cushioning measurements were some of the lowest among all the monitors we tested, and the line widths were fairly thin and consistent between color and green horizontal and vertical orientations. The test machine also showed this to be one of the most stable displays in the group.

The PMV14VC Plus has an excellent ability to maintain the correct image size when switching between different resolutions. The monitor is a multiple-frequency design, capable of syncing on horizontal scan rates between 30 and 36 kHz.

If the MAG Computronic monitor has a problem, it is with its controls. The tilt/swivel base has the standard brightness

and contrast controls mounted on the lower-right front corner. The power switch is located in the back and is rather small.

Even more significant is the fact that there are only two picture size and position controls instead of the more typical four. There is a horizontal position control (labeled "H-Phase") and a vertical size control, instead of both horizontal and vertical where you can adjust them while you are fine-tuning the screen. These controls are in the back, with the power switch, so you must struggle to find them when adjustments are necessary. The power-switch problem can be solved with a power strip, but the control issue is more difficult. Fortunately, the PMV14VC Plus holds its image size well between resolutions, so it's possible you won't need to fiddle with the picture controls frequently.

The MAG Computronic PMV14VC Plus has its flaws, but given its aggressive price and excellent image, it has to be one of the most attractive values in this group.

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- 256k Cache Memory Optional

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80486-25 CPU

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- 155MB 17MS Hard Disk
- ESDI Controller w/32k Cache
- Magicsync 1024x768 Monitor
- ATI 1024x768 512k VGA Card
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vell's SYSCON and FILER software appear in *LT Stat Plus*. All these utilities have the same types of menus, lists, entry boxes, function keys, and navigational keys.

The easiest way to learn *LT Stat Plus*'s operation is to start using it. The main menu, in a straightforward way, requires you to use only the arrow keys to highlight and select an option. The program assigns select or mark functions to specific keys on your keyboard according to where you are in the program; it then lists select key information across the bottom of the screen. Just by following the keys, you can get the reports. If you reach a place that requires help, simply press the help key. A window with the appropriate help text will appear, explaining what to do.

Novell's SYSCON program, key to the successful management of *NetWare*, doesn't release its information in printed form. *LT Stat Plus* makes up for this drawback by giving you access to the reports you need to fine-tune and effectively manage your LAN. If you're a Novell administrator, you need to have a LAN management tool like this at your fingertips.

Monitrix

by Kimberly Maxwell

It doesn't take magic for a network monitoring program to load and disappear on a *NetWare* server; at least Cheyenne Software doesn't think so. It developed two versions of its *Monitrix* product that do just that. The two packages, an \$895 NLM (*NetWare Loadable Module*) for *NetWare 386* and a \$795 VAP (*Value Added Process*) for *Advanced NetWare 286* servers, sit quietly in the background in a *NetWare*

product requires 64K RAM and runs only under *Advanced NetWare 286*, Version 2.1 or later. The prices of the two products differ substantially. However, you receive both the NLM and VAP in the more expensive NLM package, so if you buy it now you can economically move up to *NetWare 386* in the future.

LITTLE CPU LOAD, MANY STATISTICS

Both products work along similar principles. They collect network traffic statistics and monitor network nodes, disks, and

Monitrix displays statistics both in bar graphs and in numbers that indicate transmit and receive packets.

printers while placing little load on the server's CPU. At the same time *Monitrix* performs diagnostic work, letting you use the file server for normal activity. The VAP and NLM programs allow you to collect traffic statistics automatically, storing them in a separate database for later examination. If you want to see the action in real time, you can call up several *Monitrix* displays on the server console.

You can also benefit from *Monitrix*'s ability to supply extensive information in hard copy form. It can generate reports, exporting data in *dBASE* format. With *dBASE* format capability, the network administrator can customize reports for specific applications. The statistics on-screen and in hard copy form give a LAN manager a full spectrum of file server statistics and network activity reports.

Monitrix installation doesn't require a technical expert. First verify the *NetWare* version running on your LAN, then load your network manager software onto your hard drive, then finally load the network monitor software by selecting the server that will hold the VAP or NLM. In only a few minutes, you're in business.

Once you get through the installation, you continue with the program's node configurations. You may want to familiarize

yourself with the manual at this point. It gives special console commands that activate the network monitor and special key descriptions that help in *Monitrix* operation.

HELPFUL MENUING SYSTEM

Operation of *Monitrix* is a breeze. Menus and submenus are helpful; each selection includes a brief description of the task and what it accomplishes. Main menu topics include node configuration, topology and statistics, connectivity check, a report and export option, and a DOS shell. The configuration node feature offers an abundance of information on each workstation and on the user logged in on the particular machine. It also tells you version numbers of the SPX, IPX, and the board type and its settings.

In the topology and statistics section, *Monitrix* gives you a graphical display of the interconnected LANs and statistics for your analysis. The point-to-point connectivity check presents results in the form of source and destination address, users of workstations, packet size, number of diagnostic packets, packets received, transmit errors, and elapsed time.

Monitrix also includes a communications statistics menu where you can access data on SPX, IPX, drivers, the DOS shell, the file server process, and any bridge on the network. It displays statistics both in bar graphs and in numbers that indicate the quantity of transmit and receive packets.

The manual contains a glossary of

MONITRIX	
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server while performing effective diagnostic and monitoring services.

Monitrix's menu-driven tools work with all adapter cards compatible with Novell network operating systems. The *NetWare 386* NLM product requires a tiny 36K of RAM in the file server. The VAP



FACT FILE

EDITOR'S CHOICE

Monitrix, Version 1.1
Cheyenne Software Inc., 55 Bryant Ave.,
Roslyn, NY 11576;
(800) 243-9482, (516)
484-5110.

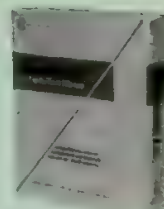
List Price: VAP
version, \$795; NLM
version, \$895.

Requires: NLM and
VAP versions: 512K
RAM in workstation; Novell's IPX, Version 2.1 or
later; DOS 3.0 or later.

VAP version: 64K RAM in server, *Advanced NetWare 286* 2.12 or later.

NLM version: 36K RAM in server, *Advanced NetWare 286* 2.1 or later; *NetWare 386* 3.0.

In Short: *Monitrix*'s network diagnostic software comes in NLM or VAP versions and monitors a *NetWare* network with ease. The product's many features make it capable of producing a comprehensive analysis of your network, and its ability to run in the background means it won't tie up your file server.



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7289 ☐ Dragnet 1.0 for Windows. 89.
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 6419 ☐ PC-File 5.0. 75.
- Caere ... NCP**
 6004 ☐ Omnipage 386 2.1. 599.

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 5039 ☐ PC Tools Deluxe 6.0. \$89.
 5038 ☐ Copy II PC 5.0. 27.
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 6360 CheckFree (electronic checking sv.) . 25.
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 4387 ☐ Who's What's When 2.0. 179.
- CompuServe**
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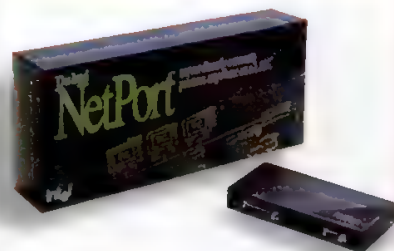
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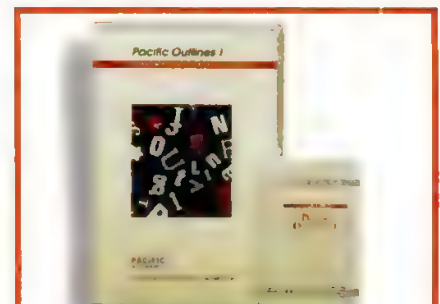


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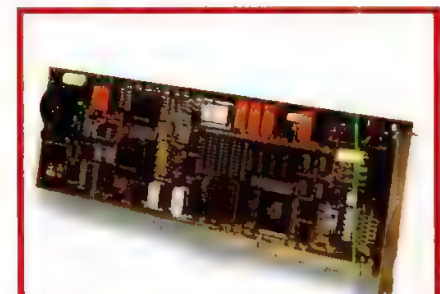
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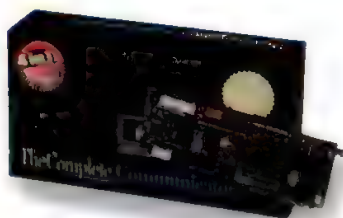
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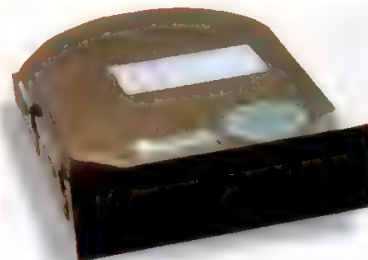
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terms for each set of statistics and can help if you have difficulty interpreting the statistics.

Whether you use the NLM or VAP version, *Monitrix* presents you with an abundance of information about your *NetWare* network. Cheyenne Software keeps the installation and operation simple, and since *Monitrix* runs in the background, you won't even notice that it's around.

NetCompanion

by R. Dennis Boatner

ETI Software states in its promotional materials that the average network is down 23.6 times a year, resulting in a whopping annual loss of \$606,000. *NetWare* managers can take heart because help is available for only \$349 per server. ETI Software's *NetCompanion* offers an integrated package of 16 management utilities specifically written for *NetWare*. The programs provide user and file management, workstation configuration, performance and queue monitoring, file server management and

NETCOMPANION			
SUITABILITY TO TASK			
Novell management			3
Real-time monitoring		2	
Expenditures and growth			3
Daily administration			3

security, and general-purpose utilities. Some of *NetCompanion*'s utilities give you the unusual ability to change between file servers just by making a menu selection.

Installing *NetCompanion* is easy. You need 320K of disk storage on the *NetWare* SYS: volume and 512K RAM on the workstation. The software takes care of most of the installation. If you have the appropriate network rights, you simply log on, map a drive letter to the server's SYS: volume, and type INSTALL.

It's easier to use *NetCompanion* than to read about it. The manual omits both an overall table of contents and an index. Also, the large number of program elements makes the package sound formidable, even though its utilities—both menu driven and command line—are simple to use. Nevertheless, the instructions and documentation aren't hard to follow.

CONNECTIVITY

STATISTICAL REPORTING

MENU-DRIVEN UTILITIES

The menu-driven utility *NETSTAT* gives you the ability to control the time periods for collecting network data. Although *NETSTAT* collects data from only one file server at a time, it lets you change between file servers easily—unlike other programs in this review. You can gather all the network information you need as long as you have console or supervisor rights.

Once you finish collecting statistics, you can view the information or print out a bar chart of specific items. Since *NETSTAT* allows exporting data files to either comma- or tab-delimited ASCII formats, you can also use the data in spreadsheets, databases, and reports.

Another menu-driven utility, *WCONSOLE*, automatically updates the equipment log whenever software or hardware changes occur. *WCONSOLE* does not limit you to monitoring just a single file server. It displays information on any node connected to any server on your particular network without requiring you to log on to the other servers.

WCONSOLE reveals configurations for all workstations, bridges, and servers on your network. You can get IPX, SPX, network shell, DOS version numbers, and other statistics without loading software at the workstations. *WCONSOLE* also maintains a workstation master list where you can keep an updated electronic notebook with information on each workstation. In this section, you can record serial numbers, boards, and drive types. The program even gives you a free-form note pad that you can use as a repair log.

WCONSOLE proves particularly useful for determining which users run which versions of the *NetWare* drivers. Old *NetWare* shells are like ghosts: they don't die, they keep coming back when people use old floppy disks or rebuild their hard drives. *WCONSOLE* can help you keep the software in each workstation up to date.

COMMAND LINE AND BATCH UTILITIES

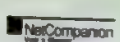
Two *NetCompanion* programs you can run from the DOS command line give you different capabilities for managing network users. *GETUSER* allows you to record bindery information for emergencies and create updated scripts of information for existing users. You can later use this information with *NetWare*'s *MAKEUSER* utility as a template for adding new users to

the network. *NCONNECT* can run from the DOS command line or from batch files to enforce user, station, or file server restrictions you set up for application programs.

Another utility, *SCONTROL*, handles network server management and security, allowing file server control from either the command line or batch files. *SCONTROL* also lets you make a backup copy of the *NetWare* bindery from the DOS command line. *SYSTAT* gives you a quick display of server status. *QSTAT* monitors your print queues quickly and efficiently.



FACT FILE



NetCompanion,
Version 1.0
ETI Software Inc., 2930
Prospect Ave.,
Cleveland, OH 44115;
(216) 241-1140.
List Price: \$349 for first
server.
Requires: 320K RAM
on workstation, 500K disk space on server SYS:
volume; *Advanced NetWare* 286 2.1 or later;
DOS 3.0 or later. Line printer recommended.
In Short: This integrated set of utilities can make
Novell LAN management less of a hassle.
NetCompanion offers on-line help and ease of
use at a price you may not want to refuse when
considering the alternatives.

CIRCLE 543 ON READER SERVICE CARD

The *FINDPATH* utility speeds up file and data maintenance. *ISDIR* verifies the existence of a directory, automatically creating it if it doesn't already exist and logging an error code if it can't be created. *VMODE* and *VTTYPE* help ensure the proper video configuration of application programs for each workstation so that an incorrect software version cannot be run.

Five other *NetCompanion* utilities assist in a general way with batch files. *CHKTIME* creates time-controlled batch files. *CURSOR* and *XCLS* help you create batch files with more effective control of cursor position and screen color. *GETKEY* makes interactive batch files easier. *KEYSTUFF* helps simulate keyboard input from batch files.

Designed by people who manage Novell networks themselves, *NetCompanion* furnishes administrators with a package of tools they can use for daily operation and emergency repairs. Its easy-to-follow instructions and documentation as well as on-line help can make managing your network much easier. *NetCompanion* uses the same interface as *NetWare*, so you'll feel

Sometimes you just need a
flexible board.

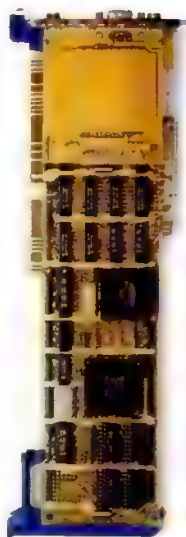


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Token-Ring just call us at
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ext. 64A*

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right at home getting it up and running in no time. Novell network managers should consider using this well-designed and affordable set of network managing tools.

NETreports

by Kimberly Maxwell

Need reports evaluating disk use on your Novell server? Brightwork Development's *NETreports* is a \$295 disk management tool that gives LAN administrators valuable information about the network's file servers. At a low cost, it offers a wide variety of options for tracking and reporting on disk usage and directory accesses. As a bonus, it furnishes all network users with a quick way to check the status of the network printer.

NETreports gives information about the network that *NetWare* utilities can't.

NETREPORTS			
SUITABILITY TO TASK			
Novell management		3	
Real-time monitoring			4
Expenditures and growth		3	
Daily administration		3	

You can retrieve the information in a printable text file or as a report displayed on your monitor from Novell's SYS:SYSTEM if the information can't be public. Most utilities within *NETreports* require supervisor security equivalence; without supervisor rights, the programs terminate and prevent any access to reports.

You can use *NETreports* from the distribution disk in the package. However, Brightwork recommends you install it on the file server in a SYS:PUBLIC directory, designating the files as read-only to protect them on the LAN. If you use *NetWare* 2.0 or later versions, you can flag the utilities as execute only. You do all designations or flagging with *NetWare*'s FILER utility. The programs use up to 39K of RAM.

DISK USAGE REPORTING

Several programs make up the application, each with a particular task, functioning either as reporting programs or tracking utilities. One program, NETRPT, generates several types of management reports on the disk usage and system configuration of individual users and groups. All contain

CONNECTIVITY

STATISTICAL REPORTING

the same kind of information, including user name, type of report, date and time, the server that processed the report, and the log-in name.

The disk usage report compiles data on disk space per user and volume. With this report, you can see the number of subdirectories owned, files owned, bytes a file occupies, and the percentage of disk space represented by the number of bytes. You can also find out which people occupy more disk space than assigned to them. Similarly, the program generates another report on users whose files exceed a defined threshold of disk space. Other programs in *NETreports* can produce a list of files not accessed since a certain date.

FILE SERVER MANAGEMENT

The application also helps manage file servers by generating reports on the file server configuration. Various reports offer configuration information of groups and individuals, including log-in scripts of each user along with trustee assignments.

NETreports assigns several identifications to each user to help administrators gather information about the file server. Identifications include logical station number, physical station number, internetwork number, file server name, user name, and log-in date and time. This gives each user trustee assignments, and the security helps a LAN administrator review access privileges.

NETreports offers the added ability to track the last time each directory on a volume was accessed in terms of the last time a user opened one of its files. If a user sim-

ply viewed a directory with the DIR command, it does not count as an access. The program checks every file in the volume you request.

NETreports also features a printer check utility that allows any person on the network to check the status of each network printer. This lets a user know whether there are any print jobs in the queue and to which printer on the network they are routed.

NETreports gives a network administrator an abundance of information through a variety of report utilities. The application's cost is low, and its usefulness can't be beat if you're looking for a tool to check your *NetWare* server and disk usage statistics.

Outrider

by R. Dennis Boatner

Perception is important, and Daystrom Data Product's *Outrider* makes the most of it. It lets a network manager watch the events taking place in up to four networked file servers on a single screen, displaying traffic lights to indicate network status.

OUTRIDER			
SUITABILITY TO TASK			
Novell management		3	
Real-time monitoring			4
Expenditures and growth		3	
Daily administration		3	

Outrider monitors and logs all the events into a file that's ready for loading into a database or spreadsheet program. With a price of \$89.95, this product delivers good value.

The program uses a minimum of 256K but works better with 512K of RAM. You should allocate approximately 700K per month for disk storage space. Installation isn't automatic, but it's not hard to do. The package includes both 5.25- and 3.5-inch diskettes, so you can install *Outrider* from any workstation with disk drives. Since it's not copy protected, you can then copy the executable program to another machine. The technical reference guide contains numerous appendices; however, the addition of an index section would help you find the installation information faster and make referencing much easier. Never-

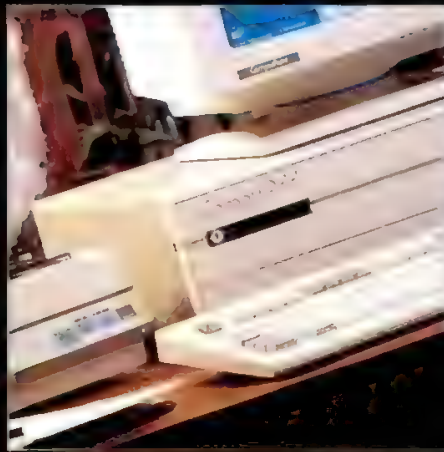


FACT FILE

NETreports, Version 2.5
Brightwork Development Inc., 766 Shrewsbury Ave., Jerral Center West, Tinton Falls, NJ 07724; (800) 552-9876, (201) 530-0440.
List Price: \$295 per server.
Requires: 39K RAM; *NetWare* 2.0 or later; DOS 3.1 or later.
In Short: *NETreports* serves as a complete reporting package for a LAN administrator who needs to know a variety of information about a *NetWare* file server and its disk usage. It includes a helpful utility that users can access for checking on the status of network printers.

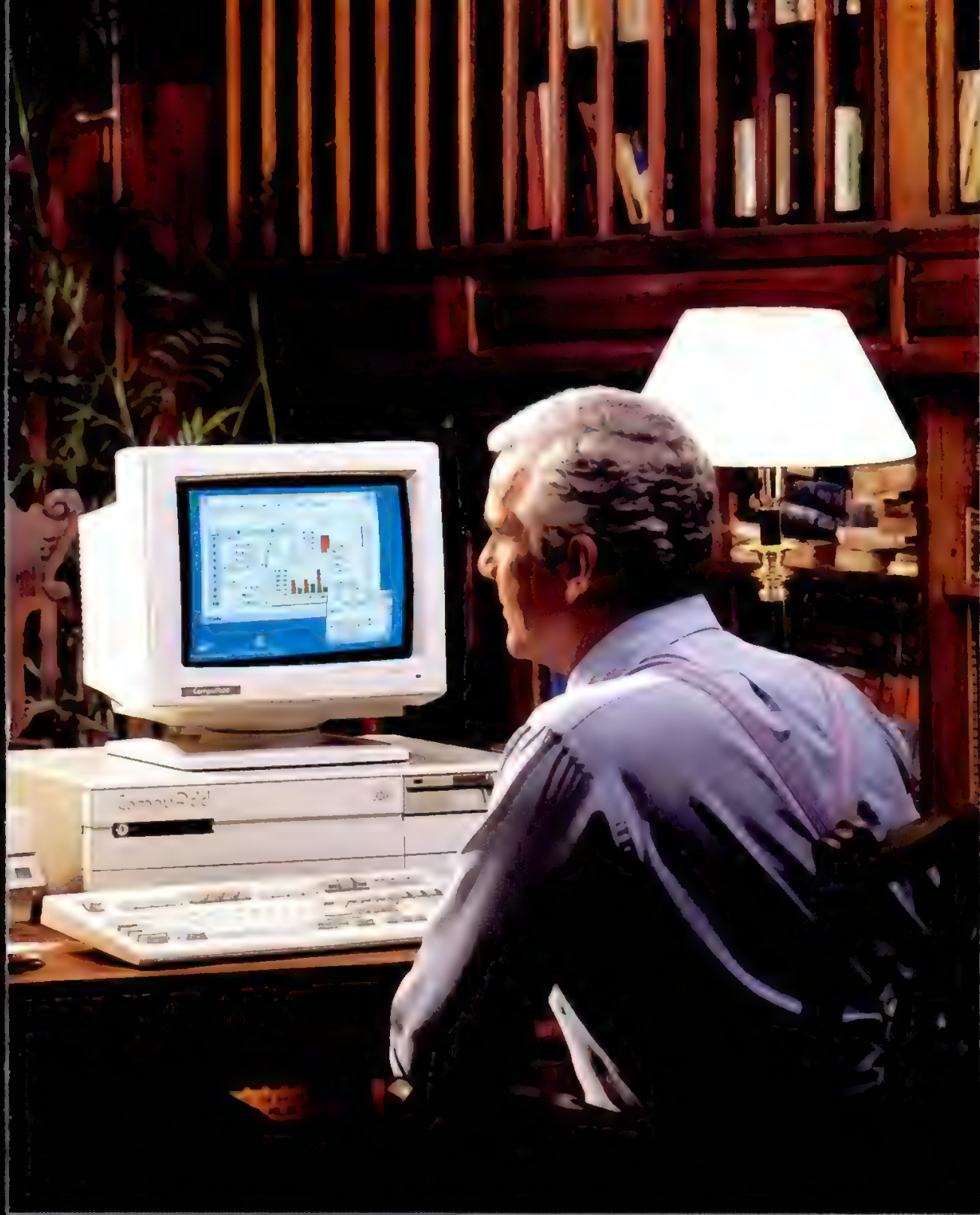
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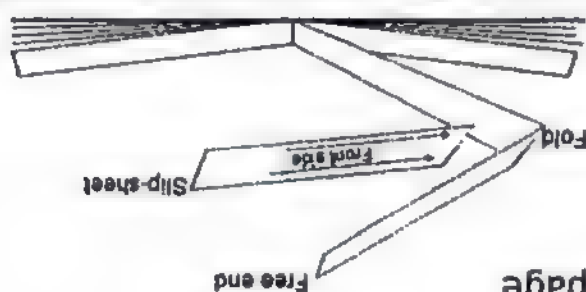
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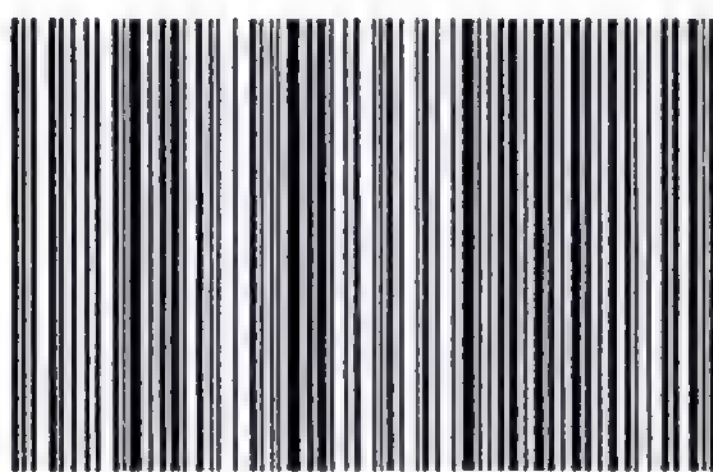
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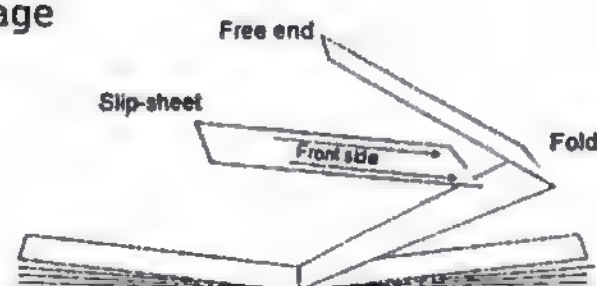


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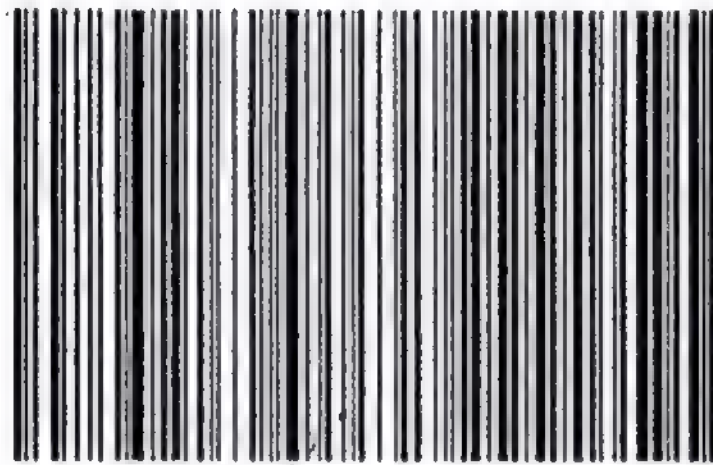
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3. Slice the folded edge
4. Close the page and slip-sheet



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Inverted Back



GbsSlipBack-0018

Back

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theless, while you're inside the program, you can access an on-line, context-sensitive help facility.

Daystrom Data Products recommends you work with a color monitor because *Outrider* uses color to alert you to network activity. VGA monochrome or regular monochrome will do, but you then have to keep a close watch on a numeric display to track the built-in and user-defined sensors. If you don't use color, you basically must do more intense monitoring to avoid missing a status change.

Outrider's designers tailored the pro-


FACT FILE

Outrider, Version 1.0
Daystrom Data Products, 15 Sunnise Hill Rd., Fishkill, NY 12524.
(914) 896-7378.
List Price: \$89.95 per server
Requires: 256K RAM (512K recommended); Novell's Advanced NetWare 286 2.0 or later or NetWare 386. Color monitor recommended.
In Short: *Outrider*, Daystrom's user-modifiable monitoring and logging program, offers a lot of information for the LAN administrator at a price far below its competitors. It can present a picture of activity for four servers on-screen simultaneously and display warnings with easily understandable traffic light-type symbols.



CIRCLE 545 ON READER SERVICE CARD

gram exclusively for *Netware 286* LAN environments, although it will also work with *NetWare 386*. It can monitor CPU use for up to four file servers, all on a single screen. The built-in sensors track the maximum and available number of directory entries, plus the total and remaining disk space for up to five network volumes.

TRAFFIC LIGHT WARNINGS

Outrider's traffic light-type symbols display the file server status. A green light means your network is okay; yellow indicates a warning; and red means that a dangerous network condition exists. *Outrider's* built-in default values trigger the alert thresholds, but you can define your own trigger parameters should these values not fit your specific needs. You decide exactly when these colors switch and what each color change situation really means. A yellow light for you may be a green light for someone else. Screen refresh and data-writing actions are also user-definable.

You can monitor either users or elements of the network. The program uses

CONNECTIVITY STATISTICAL REPORTING

subroutines that it calls *sensors* to monitor specific functions or parameters. These sensors use their own set of traffic light-type symbols, so you can track all elements easily. And programmers needn't despair: You can write custom sensor programs to monitor your specific network environment. Alternatively, a programming guide helps nonprogrammers build their own sensors. You can write a sensor to warn you when the file server dates and times fall significantly out of sync, to verify that a gateway or bridge is logged in, or to watch for the number of connections on a certain server.

If you want a history of the data from *Outrider*, you can examine the information in the comma-delimited ASCII log files it generates. You can also export the files to a spreadsheet or database program to perform long-term analysis. By importing the log files into a spreadsheet, it's an easy matter to build bar graphs of server use and other factors. Since *Outrider* closes log files between update periods, you get immediate access to network statistics while *Outrider* is running. You can also change the update periods from their default time of 20 minutes. The program supplies record layouts of the log files for easy reference.

READABLE SCREEN LAYOUT

If you have any experience running *NetWare*, then you know how intense the screen can look when you use the *NetWare* VOLINFO utility. You'll find *Outrider's* display easier to read than VOLINFO because of the color-coded alerts.

The basic screen layout shows the name and CPU use for each monitored server in a column about an inch wide on the screen. The next column displays the information in short blocks for the volumes on each of the servers. Within the column, the volume blocks split in half to show both the available and maximum number of directory entries on the left and available and maximum disk space on the right. The last four lines of the screen track the information requested by the user-defined sensor routines. A menu bar extends across the top of the screen.

Outrider is a must-have product for any *NetWare* administrator. It offers a network monitoring and logging program that's quick, cost effective, and easy to use and learn. Besides watching it generate an ongoing visual display of network status, you

can track CPU use, directory entries, and disk space. The price is perfect, and the picture it gives you on the screen delivers immediate insight into the health of your network.

Perfect Menu

by R. Dennis Boatner

LAN administrators, take a close look! Here comes a sophisticated multipurpose network product: International Computer Group has a winner with its new release of *Perfect Menu*, Version 2.3. And *Perfect Menu* has an attractive price, ranging from \$129.95 for a basic single-user system to \$395 for a LAN Pak System that permits an unlimited number of users. It includes access and control for a wide range of applications, along with such unusual fea-

PERFECT MENU SUITABILITY TO TASK			
Novell management			3
Real-time monitoring	2		
Expenditures and growth		3	
Daily administration			4

tures as e-mail and peer-to-peer communications.

Perfect Menu, or *PM*, offers a total LAN front-end that's compatible with all DOS-based LANs. The great thing about this program is all the power it gives without needing to go memory resident. It can operate either in memory-resident mode or call up the menuing program when necessary. *Perfect Menu* features internal access to 640 menus and over 10,000 command options for each menu. It also possesses the ability to nest directories 32 levels deep.

Although it's easy to install, it offers three levels of installation: novice, intermediate, and advanced. Both novice and intermediate work about the same. The advanced level lets you configure an on-screen clock, mouse, and color monitor. Advanced level also requires the administrator to place the destination drive in the system PATH or make sure it's listed as a network search drive.

One shortcut for installing this program is the Autobuild facility. It scans the available or specified drives and creates all the necessary instructions for program execu-

CONNECTIVITY STATISTICAL REPORTING

tion. It allocates 3K to 5K of disk space for each menu and allows you to add a menu item while *PM* is resident.

For those who hate to read the manual, *PM* offers two special features. The first is an on-line reference guide containing over 80K of information. It's accessible through a standalone program called Guide or from inside *PM* through the menu bar. The second feature is a very helpful built-in tutorial.

E-MAIL AND PEER-TO-PEER

PM allows you to customize your own environment. For example, you can change the color and menu selections on a given menu. The network version also includes a full-featured electronic mail system with predefined categories, broadcast and certified mail capabilities, and an overview of all e-mail messages on the system.

Peer-to-peer communications also sets this program apart from others we have reviewed. It can create a forum devoted to specific topics and allow real-time message input. *PM* makes for such a versatile LAN tool that it supports both public and private forums. It also offers access tracking to help you keep up with jobs, projects, and resources. This feature provides an extra tool to help manage your areas of responsibility.

ADMINISTRATIVE AND USER POWERS

PM has a wealth of other functions and LAN tools to aid LAN administrators while network users are on-line. It allows control over user access, maintains usage and tracking information, and enables you to create and distribute menus to users. It also lets you meter an individual's use of various resources—both hardware and software. You can issue passwords allowing individuals to logon and make menu selections; *PM* also gives you access to a list of passwords at different levels of security. You can suspend or reinstate any user on the system and restrict a user's access time.

Defaults for color can be set either system-wide or locally by each individual. Users can have access to other features as well: an on-screen clock, use of a mouse, and screen-saver utilities, as well as other tools, help achieve total customization. A RUN option launches executable files, and anyone who wants to get away from menus can use a system command line and a viewing option for directory information. *PM* offers a full-screen editor, and users can also work within its operating

system shell and file manager. Some of the shell features include directory trees, pop-up drive selection, and file options such as copy, delete, move, and print, just to name a few. Another option that users can access is a self-diagnostic capability which ensures that all file pointers are correct.

ACTIVE AND COMPREHENSIVE REPORTING

The heart of *PM* lies in its reports. The LAN administrator can consult them to make sure the network is running without problems. Monitoring of sensitive areas also ensures that no one is tampering with privileged information. A daily log outputs all tracking information on both users and resources to the screen or printer and sorts it by time of day. The Menus Listing displays menu setup information for each user at his or her station. A project log report gathers project tracking information

user is logged out; when the user is logged in, it can relate the user's status at any given time. The status command works in tandem with the package's tracking function to supply this report to the network administrator or manager. The Show User Status report also can display the current status of specified users, including the last time they used their system and their current log-on state.

The Tracking Overview report furnishes the LAN administrator with information on system usage as well as project and cost data. This report keeps information in a private directory that maintains a log file for every user. *PM* stores all this data in *dBASE III Plus*-compatible files for further analysis. And *PM* has yet another powerful access tool in its Global Search tracking feature, an option that gives the administrator access information classified by date, description, job, name, and action.

MORE POWERFUL UTILITIES

The User Overview section of the menu includes utilities that allow the administrator to add, delete, copy, edit, update, and list all users on the system. If all this is not enough, *PM* comes with another impressive set of utilities. These include an ASCII chart, automatic log-off, the ability to browse .DBF files, a calculator, a calendar, and a digital clock. It doesn't stop there, either. Context-sensitive help, an international time zone manager, a keyboard lock, log-on password protection for your system, menu index, on-line guide, and virus protection round out this full-featured program.

PM comes with unlimited technical support in the U.S. and Canada via a toll free number. Nevertheless, since *PM* includes a built-in error-handling system and a complete set of diagnostics, chances of a major problem occurring with the package are small. Registered users can upgrade to the current version by paying 25 percent of the retail price.

PM offers the most complete and versatile LAN statistical reporting package this reviewer has tested. Its flexibility and transparent gathering of network information gives LAN administrators an excellent set of tools. Its peer-to-peer communications, e-mail handling, virus protection, and reporting capabilities contribute to making this product a definite front-runner for network managers. If you're looking within this low price range, don't pass up this product!



FACT FILE

Perfect Menu, Version 2.3
International Computer Group Inc., P.O. Box 7469, Gaithersburg, MD 20898; (800) 833-2324, (301) 670-7007.
List Price: Single user, \$129.95; 5 users, \$249; unlimited users, \$395.
Requires: 384K RAM to load, 11K resident, none nonresident; 1MB of hard disk space; any DOS-based LAN; DOS 3.1 or later. Extended or expanded memory recommended.
In Short: One of the most complete and comprehensive statistical reporting programs, *Perfect Menu* possesses tremendous power: its report-gathering information seems transparent to the user. An integrated software package, *PM* combines file management, user menus, e-mail, peer-to-peer real-time communication, virus protection, and on-line help with detailed reporting on network conditions.



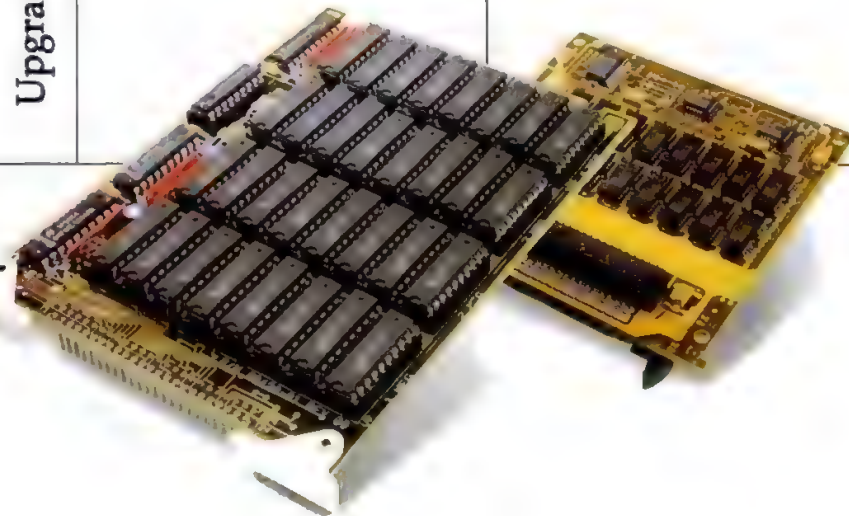
CIRCLE 646 ON READER SERVICE CARD

for users and groups and sends it to the screen or printer, sorting it by project. *PM* keeps track of project members' usage of the various network resources that the administrator allocates to ongoing projects. *PM* can then direct the resource metering information to the printer. A usage log, sorted by time of day, also records information on all listed users.

The user profile report prints general information about ID, name, date, and time last used. As one of the strengths of *PM*'s system administration, it records when a

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Warranty	Lifetime	One Year
Upgradeability	Fully Upgradeable to 4 MB	Not Upgradeable



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CIRCLE 241 ON READER SERVICE CARD

See Us at Seybold #2402

Saber File Manager

by R. Dennis Boatner

Saber Software has come up with a \$395 network menu system that combines a network-oriented file manager with a LAN administrator engine to create an unusual high-function environment for both LAN users and administrators. *Saber File Manager* offers a powerful format for manipulating files and directories. Its menu system gives you a choice between simple menu-driven operations or a file-oriented point-and-shoot method of running applications, editors, and file viewers. However, it offers only limited statistical reporting capabilities that are mainly beneficial when used with another Saber product.

Saber File Manager works hand-in-hand with *Saber Meter* (see "Building Workgroup Solutions: LAN Metering Software," *PC Magazine*, September 11, 1990) to give LAN administrators a complete set of network diagnostic tools. The company has designed *Saber File Manager* for use with Novell's *NetWare*, 3Com's *3+Open*, Banyan's *VINES*, IBM's *To-*

ken-Ring, CBIS, and MS-NET based networks.

INSTALLATION AND LOG-IN FEATURES

Installation is very simple but involves modifying a series of files. Separate installation manuals for various network systems show how to do this. The user manual and network installation manuals all have superb documentation and troubleshooting

SABER FILE MANAGER		
Novell management	3	
Real-time monitoring	2	
Expenditures and growth	2	
Daily administrative	3	

guides. And since the program is available in 5.25- and 3.5-inch formats, it's easy to install from either drive.

After installing the files, you should next set the log-in feature. A log-in panel gives the administrator control over start-

up files to execute after successfully logging on and, for Novell users, allows autorouting to a designated server in a multiserver environment.

A profile feature lets you configure a menu that displays a choice of memory-resident programs after you log on. You can set up other files that tell the startup processor to execute commands based on the log-on ID and physical station number you are using. You also have the ability to do extensive manipulation of the DOS environment at startup time. And system administrators can choose to broadcast a message over a specific period of days to a group of users at log-on time.

MENU FEATURES AND UTILITIES

Saber File Manager offers fully customizable menus. You can password-protect any portion of the menu and add mouse support to specific items as well. Individual items can also be configured to run in batch mode. This reduces memory overhead by removing the menu itself from RAM while the command executes. The administrator can define up to 39 accessory key macros that appear across the bottom of the menu and enable users to per-

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CONNECTIVITY STATISTICAL REPORTING



FACT FILE

Saber File Manager, Version 2.0

Saber Software Corp.,
P.O. Box 9088, Dallas,
TX 75209; (800) 338-
8754, (214) 361-8086.

List Price: \$395 per
server, \$600 extended
license.

Requires: 484K RAM per workstation; Novell,
3Com, Banyan, IBM Token Ring, CBIS, or MS-
NET network; DOS 3.1 or later.

In Short: *Saber File Manager*, a network-
oriented file manager, gives the LAN
administrator an excellent set of flexible network
tools. However, it offers limited statistical
reporting capabilities. To generate more
information, you need to run the program with
another Saber Software product, *Saber Meter*.

CIRCLE 547 ON READER SERVICE CARD



LAN administrators also have access to special utilities, such as a compiler and de-compiler for menu-definition files, a report generator, a process controller that will wait until a specified hour to run a particular program, and a message handler that displays formatted messages to users. Other utilities test whether Novell or Banyan network shells are loaded, reboot workstations, hide *Saber File Manager* files from users' DOS DIR listings, check for free RAM, disable users' ability to Ctrl-Break out of batch files, and check the system time before running a utility. Administrators and managers can create, maintain, and distribute menus anywhere they wish on the network.

REPORTING CAPABILITIES

Saber File Manager gives the LAN administrator extra tools to generate statistical reports, mostly from information supplied by *Saber Meter*. It also gives the administrator some added options, such as control over user log-offs and the ability to prompt users to enter text, select a file or disk drive, or choose from a list of entries.

But in terms of statistical reporting, it's probably one of the more lacking among the products reviewed here. As a stand-alone program without *Saber Meter*, it does an adequate job as a file manager, especially for network users. But it doesn't offer as many options for the LAN administrator as competing packages. Administrators can get a few reports from it, but it may not be worth the price for its reporting capabilities alone. If *Saber Meter* is already in place, however, it's to the administrator's advantage to purchase *Saber File Manager* as well.

Saber Software has found a niche in the LAN administrator software market. The company offers an excellent file manager, along with unlimited toll-free technical support for the end user and administrator. By themselves, however, *Saber File Manager*'s statistical reporting capabilities are not extensive; the program needs to work with *Saber Meter* to yield much information. Besides *Saber File Manager* and *Saber Meter*, Saber also offers other network tools, including *Saber Secure*, which allows a user to secure a workstation without exiting or logging off, and *Saber Print Manager*, which controls access to net-

form functions like screen blanking with a single hotkey or key combination. Accessory key macros can also call up either a regular algebraic-style or Hewlett-Packard-type calculator. Administrators can customize help screens as well as color control and menu placement for each workstation.

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ChipSoft

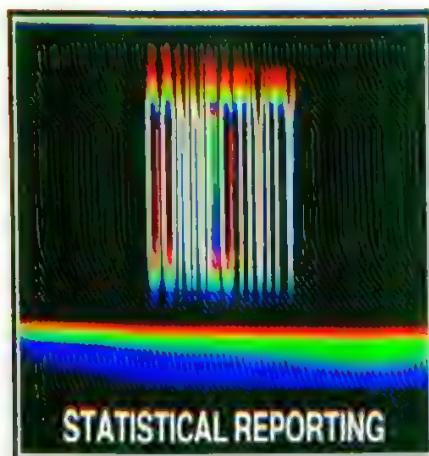
work printers. All of these products help make the LAN administrator's job easier.

SCUA Plus

by R. Dennis Boatner

TGR Software's *SCUA Plus* streamlines your PC operations and protects your system from loss of information, theft, and virus infection. *SCUA* (an acronym for System for Coordinating Users and Applications) doesn't offer detailed statistical reporting capabilities, however. It tells you just the basics: who's using what and how often they're using it. The price of *SCUA* installations depends upon your system and corporate requirements. The single-user pilot license sells for \$600 for one copy. The next step up, intermediate level, allows entry at a 24-node level for \$6,000, or \$250 per copy. At an additional five price levels above this, the final cost comes down to \$60 per copy for a master limited license. The price can go as high as \$90,000 for 1,500 copies under this limited license. Unlimited licenses are available at negotiable rates. But such high network-wide costs put the program out of balance with its capabilities.

SCUA helps resolve trade-offs between



ble of contents and index sections. Installa-

tion is fast and easy. Once it's installed, *SCUA* primarily performs the function of protecting the confidentiality of information and speeding up access to application programs, particularly for nontechnical users. You define user profiles and applications; *SCUA* restricts authorized users to only those files and applications they need

to use while keeping unauthorized users off the network.

AUDIT TRAIL REPORTING

SCUA does its statistical reporting through an audit trail showing all access activity. Its log files maintain reports showing which users accessed applications and files, when they did it, and to some extent how the session went. It logs file accesses, usage by application type, network activi-

SCUA PLUS

SUITABILITY TO TASK		
Novell management	3	
Real-time monitoring	3	
Expenditures and growth	3	



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ty by defined groups of users, the time used, unauthorized access attempts, and the workstation name.

The program doesn't give you as much

**FACT FILE**



SCUA Plus, Version 2.01
TGR Software Inc., 2 Ravinia Dr., #330, Atlanta, GA 30346; (404) 390-7450.
List Price: Single user, \$600; 24 nodes, \$6,000 (\$250 per copy); 1,500-copy limited license, \$90,000 (\$60 per copy); unlimited license, negotiable.
Requires: 15K RAM in workstation, hard disk, supervisor or equivalent status for audit trail capability, DOS 3.1 or later.
In Short: SCUA Plus is an expensive LAN-compatible product offering selective security, audit trails, hard disk management, copyright infringement protection, and on-line help. Its ability to detect and prevent virus infection to your system is a real plus. Its reporting capabilities are limited to the basics of who's using which applications and workstations and how often.

CIRCLE 548 ON READER SERVICE CARD

CONNECTIVITY STATISTICAL REPORTING

Monitrix, Perfect Menu, and The Lomax Utilities. It contains a fair amount of network accounting capability but nothing that particularly stands out. Since SCUA basically relies on the reporting capabilities of the network operating system, it puts less emphasis on its own reporting and does not give you such niceties as the percentages of disk and drive usage.

VIRUS AND UNAUTHORIZED ACCESS PROTECTION

Nevertheless, we found SCUA excellent in its ability to protect your system from virus infection. If a virus enters your system, SCUA alerts you to its presence. SCUA also manages directory and file paths, reducing the number of keystrokes needed to access file applications and thus saving time while you search for misplaced files.

SCUA also prevents users from installing unauthorized software, thus guarding against copyright infringement suits. Similarly, it bars unauthorized users from accessing sensitive files and possibly damaging them. The program also makes sure that authorized users don't reformat your

hard disk by accident.

On-line help makes SCUA's operation simple for users. The program takes an approach similar to mainframe security measures while making the system easier to operate. Nevertheless, TGR recommends 4 to 6 hours of basic product training for two designated support persons. The company also offers 8 to 12 hours' worth of advanced product training. Both types of training can be done at either a client's office or TGR's. The client pays for travel and accommodation.

Although TGR offers telephone and field assistance for the initial installation, it limits its technical support to your two support persons and offers it only during normal business hours (9:00 A.M. to 6:00 P.M. EST). After the first year it has an annual-charge maintenance agreement that covers upgrades and ongoing support.

SoftBreeze

by Sara Parker

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CONNECTIVITY STATISTICAL REPORTING

shoot application usage and files across a network, SoftShell Systems' *SoftBreeze* gives managers a quick and easy way to maintain control over their LANs. At \$49 for the single user and \$250 for the LAN package, the menuing system makes an affordable administrative choice, generating reports on disk and system usage.

Installation couldn't be easier. The program loads from the server, then looks at the video board, I/O ports, and memory

SOFTBREEZE SUITABILITY TO TASK		
Novell management		3
Real-time monitoring	2	
Expenditures and growth	2	
Daily administration		3

maps for each workstation and creates a database under each user's name. The program refers to this database for all actions. While scanning hard disks, it automatically installs any program it recognizes under one of its application categories and pull-down menus. Programs it doesn't recognize can be installed via the *SoftBreeze* editor's pull-down menus.

Advanced installation options are available to the administrator, including choosing a time interval for the screen blanker, password protection, and locking out users from DOS.

Because *SoftBreeze* uses only shared

files and makes no specific network calls, it should work with any network operating system. The program operates as a TSR, taking up 31K of RAM. One of *SoftBreeze*'s key features is its file management utility, which emulates DOS copy, erase, and rename commands; programs can also be executed from here.

A BREEZY WORKOUT

An important part of *SoftBreeze* is an application programming language called Nautilus. Nautilus is a high-level language that allows you to gather information about and control applications. Writing a Nautilus program is about as difficult as writing a batch file. It took about 10 minutes, with the manual open, to write a Nautilus program that could track the use of *WordPerfect* on the network.

A must for LAN administrators, the FILETRAP utility traps DOS calls; it makes an ASCII record of the activity. (The ASCII data can be imported into other database programs to generate simplified reports.) FILETRAP helps you analyze disk or system usage and optimize path structure. You run FILETRAP for each workstation in order to gather information about what users and applications do on the network. Since it works by reporting the interrupts programs use and the error messages that come back from DOS, it's particularly useful for finding conflicts between programs, such as TSRs. FILETRAP isn't a program a supervisor runs all day every day, but it's useful for finding problems and for sampling and developing a baseline of network activity.

DISK MAP maps the hard disk drive and reports disk space used by directories, indicating the number of files contained within each directory. Often, small files will use many times their needed storage space because of the way DOS segments storage; to give you a measure of file storage efficiency, DISK MAP notes the size and number of the files. It helps you manage inefficient storage by moving files, un-erasing unneeded files, or backing up seldom-used files. Besides these reporting facilities, SoftShell Systems plans to add utilities that let you prune whole directories or subdirectories and change attributes on a file, subdirectory, or directory level.

SoftShell is a small company, but its two full-time employees expertly handled our technical questions. A free 24-hour bulletin board service is also available. If you like having a knowledgeable person available to answer your technical ques-

FACT FILE

SoftBreeze, Version 3.1

SoftShell Systems,
1163 Triton Dr., Foster
City, CA 94404; (415)
571-9000.

List Price: \$49 for
single user, \$250 per
server.

Requires: 31K RAM; 1MB of hard disk space;
NetWare, 3Com's 3+ Open LAN Manager, or
IBM Token-Ring networks for network use; DOS
3.0 or later.

In Short: *SoftBreeze* offers an easy, affordable LAN administration tool that will increase productivity from the day you start using it. It combines several necessary products into an efficient file-management tool. Reporting capabilities include a detailed listing of all operating system calls that open and execute files.

CIRCLE 548 ON READER SERVICE CARD



The computer inside.

Since buying a computer today is such a numbers game, here's a simple rule of thumb. Look for 386™SX, 386™ or 486™ on the outside to be certain that you have Intel technology on the inside. From the company that invented the microprocessor. The company that has shipped over 10 million 32-bit processors. The same company that's investing over \$1 billion this year

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HealthCare COMPARE quickly grew into America's largest independent medical necessity consultant, without experiencing MIS growing pains. "With NetWare, we've been able to grow from six to 600 employees in six years, using basically the same system," says John Krakauer, chief operating officer of HealthCare COMPARE.

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"Our network must continue to be a reliable, high-performance system, regardless of our size, so that we can

continue to be responsive to our clients," continues Krakauer. "Using NetWare, we can find any one of half-a-million patient records in one or two seconds. And to date, we have experienced no network downtime as a result of a NetWare failure."

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CONNECTIVITY STATISTICAL REPORTING

tions—not to mention the features of the program itself—then put *SoftBreeze* on your shopping list.

TXD

by Gaylan W. King

Introduced in 1989 as an addition to complement its network adapter cards, Thomas-Conrad Corp.'s *TXD* is an excellent diagnostic tool at a price any organization can afford. The truth is, a product this good is worth several times its \$195 per server price tag.

Version 1.01 of the software is free to 1.0 owners—talk about making an offer you can't refuse! The latest version comes in the form of a full-featured package with more power, increased speed, and greater ease of operation. *TXD* works well with ARCnet, Ethernet, Token Ring, and other environments (whether self-contained or bridged) that run Novell's *Advanced NetWare 286*.

TXD operates from either a high-density floppy, local hard drive, or network hard drive. In the latter two cases, you

TXD

SUPPORTS TO TASK		
Novell management		3
Real-time monitoring		3
Expenditures and growth		3
Daily administration	2	

need simply copy the software into a *TXD* directory. The recommended method is to install the program on a network drive from a workstation. You'll then have access to it from any node on the network.

The *TXD* code resides in approximately 640K of RAM. The system requires that the IPX/NET3 *NetWare* shells be loaded, which themselves consume 54K. While that's a lot of memory, having even 100K of RAM free is enough to manage a 1,000-node internetwork with *TXD*.

Operating *TXD* is simple because of its excellent menu system and on-line help features. Within the first few seconds of operation, *TXD* maps the entire internetwork by node ID number and user name, where applicable. This function supplies the user with descriptions of hard-

FACT FILE

TXD, Version 1.01

Thomas-Conrad Corp.,
1908-R Kramer Ln.,
Austin, TX 78758; (800)
332-8683, (512) 836-
1935.

List Price: \$195 per site license.

Requires: 640K RAM;
Novell's IPX.COM; *NetWare* 286 2.10 or later;
DOS 3.0 or later.

In Short: *TXD* defines the low-priced class of Novell LAN management and diagnostic software. It's a solid performer and represents an outstanding value. The program can produce reports on bridges and gateways as well as on workstations and servers.

CIRCLE 560 ON READER SERVICE CARD



ware configurations and software versions for all the pieces—servers, gateways, and bridges among them. *TXD* allows you to sort all lists by user name or node address.

BEATING BREAKDOWNS

TXD's designers created the program to work even when the system is malfunctioning, not just when it is operating according to plan. If the server goes down, *TXD* still runs node-to-node to give you an accurate picture of your system status. Additionally, you don't need to know which node is malfunctioning before you begin an analysis; *TXD* tells you the status of each node.

TXD's program menu allows the user several choices of action. You can conduct, transmit, and receive tests to analyze the communication between specified nodes. You can analyze one node or any combination of nodes by specifying performance thresholds or simply accept the program's default settings as a starting place. After testing, *TXD* displays a list of nodes with test values greater than the preset parameters. When selected, each offending node lists the specific error, describing and listing possible solutions. For example, if you set the performance threshold for IPX packet hits as 1 at the outset and that number increases to 2, *TXD* knows that what has occurred was an error. It might suggest that a cable may not be clean, or a wire might be loose, or a variety of other possible causes. There's nothing else on the market that can give you this ability for less than a couple of thousand dollars.

In Continuous Mode, *TXD* allows you to monitor any 2 of 46 diagnostic param-

CONNECTIVITY STATISTICAL REPORTING

ters on all or any of the workstations, servers, or bridges. *TXD* stores the information gathered in an ASCII file, which you can print from DOS.

Technical support is available via a toll-free number. More help comes in the form of a newsletter that passes on diagnostic applications gleaned from several thousand *TXD* users in the field. Why don't more manufacturers do business this way?

Detailed trouble-shooting on a network is not simple, but software tools like *TXD* certainly make the process a little easier. This passive diagnostic tool helps LAN managers identify, isolate, and resolve network problems at minimum cost. If you want to know how well your internetwork is operating, then *TXD* is for you.

WatchDog Network Monitor

by Kimberly Maxwell

If you're looking for a watchdog to patrol your local area network, Network General Corp. has a breed all its own. The \$1,995

WatchDog Network Monitor is a sophisticated animal, capable of both metering and reporting usage of your network and its resources.

WatchDog includes network monitoring software and an Ethernet adapter card that plugs into the monitoring PC, which can be any workstation on the network. While the half-length card itself doesn't differ from any of the other Ethernet adapters you may have installed on your LAN, the software includes special drivers for it. Since this is the only product in the review that requires hardware, installation will be a little more complicated than it is for the other systems, where getting up and running is a simple matter of loading software. The software part of the package requires 512K of RAM.

The WATCH program runs in foreground mode, letting you do such things as view statistics and generate reports. With WATCH active, the background WATCHDRV program continuously monitors network traffic. If the program detects an error condition it sets off an attention-getting bark and gives you an on-

screen message. You can set error thresholds for the entire network or on individual workstations.

WatchDog can collect statistics on up to 1,024 nodes on a network. One drawback, though, is its inability to monitor networks through bridges or routers, so if you have a portion of those 1,024 nodes on another network, you'll need a second *WatchDog* package.

WATCHDOG NETWORK MONITOR

SUITABILITY TO TASK		
Novell management		3
Real-time monitoring	2	
Expenditure and growth		3
Daily administration		3

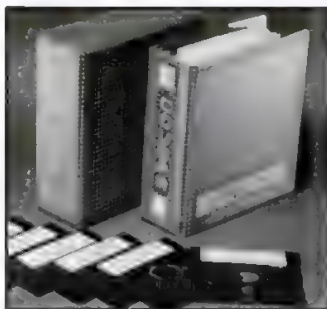
DOGGING YOUR NETWORK'S STEPS

WatchDog is a comprehensive statistical device, detecting intruders, finding traffic overloads, and distributing traffic evenly among servers. It gathers statistics particularly valuable to a LAN administrator, in-

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CONNECTIVITY STATISTICAL REPORTING

cluding the number of error packets, protocol usage, and packet size distribution across the network. Keeping a log of this information will enable you as the LAN administrator to go back and compare past reports to current ones when a problem occurs. The information will also help you plan network expansion with *Watchdog* and discover performance information about your network.

You can also see information on the use

of an individual workstation: For example, what applications particular users work with, how long they spend on them, and how much stress they put on the LAN.

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FACT FILE EDITOR'S CHOICE

Watchdog Network Monitor, Version 1.00

Network General Corp.,
4200 Bohannon Dr.,
Menlo Park, CA 94025;
(415) 688-2700.

List Price: \$1,995 per
network.

Requires: 512K RAM;
IBM AT, PS/2, or
compatible; one 1.2MB,

720K, or 1.44MB disk drive; Ethernet or IEEE
802.3-compatible network; DOS 3.1 or later.

Color monitor recommended.

In Short: Watchdog Network Monitor offers a hardware/software solution for LAN administrators looking for a monitoring tool. This package gives a lot of different information about individual workstations and the entire network in easy-to-understand reports, including analyses of historical data that can help you plan network expansion. It alerts you to dangerous network threshold points with an alarm that sounds like a barking dog.

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can erase past statistics.

When you begin monitoring your network, the information about each station will be held in a database. The on-line help facility gives you needed information about *WatchDog*, and if you need more aid, error messages that appear on-screen are fully explained in a helpful section of the manual. One thing that might be a little more confusing than helpful is the way the program's menu system uses windows: They move from right to left. When you choose a certain subdirectory by highlighting the selection, you will see the options associated with the highlighted item to the right. We've seen the same menu system used on NetWork General's *Sniffer* protocol analyzer and on the *Navigate* program from Performance Technology.

The price of *WatchDog* may seem high for most users, but remember that the product is capable of handling a high number of nodes. Additionally, the program (formerly sold by Legend Software) gives an abundance of statistical information about individual workstations or the network as a whole, and that information will help you better manage tasks and project future expansion. ■

R. Dennis Boatner is a computer consultant working in Florida. **Gaylan W. King** is the manager of a large federal government network. **Kimberly Maxwell** is a frequent contributor to PC Magazine. **Sara Parker** is a computer consultant and contributor to PC Magazine.

Five lessons other companies have yet to learn about PostScript® printing.

1 *Genuine Adobe® PostScript.®* You need a true Adobe PostScript printer. The Silentwriter2 290 printer from NEC. Some companies emulate PostScript with clone interpreters or add-on cartridges. Others have limited font capabilities. But that's not the way to produce eye-popping newsletters, or 3D charts. We've known this since we introduced our first Silentwriter LC 890 printer back in 1987.

2 *MS-DOS® and Macintosh® Connectivity.* That's right, the 290 works with both Macintosh and PC-compatibles. And with its standard Centronics parallel, RS-232C, RS-422 and AppleTalk™ interfaces, the 290 is ideal for stand-alone or network environments.

3 *WYSIWYG Screen Fonts.* As in What-You-See-Is-What-You-Get. Our printer support kit included with every 290 we sell includes software that lets you see all of the printer's 35 scalable typefaces before you print them out. Also included are diskettes that allow you to install the fonts on any Macintosh or under Microsoft® Windows™ in the MS-DOS environment.



4 *Memory.* With a full 2 MB of standard memory, there's simply no more worry. Since now you have more than enough memory to print a full page of text and graphics (letter or legal size) without losing valuable data. Plus the optional user-installable 2 MB of additional memory satisfies your need to store downloadable fonts and overlays.

5 *Software.* The Silentwriter2 290 is the printer of choice for MS-DOS or Macintosh users working with hundreds of the most popular software packages. With an installed base of over 100,000 Silentwriters, our experience with printer software is hard to beat. Meaning you get more than just a printer, you get answers.

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"NewWave's attractive icon-based interface eliminates the need to be concerned with the directory structures and file types of MS-DOS. A data file and the program code used to create, display, and print it are treated as a single object. To work with a file, you select the icon that represents both. To print the file, you move its icon on top of one that represents your printer."
—PC/Computing



"The HP NewWave environment takes Microsoft Windows into an entirely different dimension—one defined by objects, icons, and agents. The new terminology spells incredible, almost instinctive, ease of use, plus dramatically shorter software development times."**
—PC Magazine

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—Datapro

"Under NewWave, (Lotus) 1-2-3 gains a lot of features and functions it never even had under DOS, even though it's not a NewWave application."
—PC Week

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—MIS Week

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—MIS Week

"The appearance and functionality of the NewWave environment replicate the legendary Macintosh ease of use to a greater degree than any other PC graphical user interface to date."
—Datapro

"Definitely the shape of things to come."
—Practical Computing



"Hewlett-Packard's NewWave is an exceptional advance in user interface design, rendering PC software dramatically more capable and simple to use. It also beats the pants off of the disappointing OS/2."
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"Hewlett-Packard's NewWave is built on top of Microsoft Windows, and it bears a strong resemblance to the Macintosh desktop. It redefines how people should use software and how developers should build it."
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"The vendors backing NewWave read like a Who's Who of the providers of some of the most innovative products for IBM and compatible systems... about as close to state-of-the-art as you can get!"
—PC Week

"...NewWave looks much like Windows, on which it is based, but it goes much further!"
—Practical Computing

"Its Object Management Facility brings with it object-oriented capabilities that, for the first time, meet, if not exceed, the capabilities of the technology underlying the Apple Macintosh user interface."
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Redefining Presentation Graphics:

Microsoft PowerPoint



by Luisa Simone

**Presentation graphics
on the PC will never
be the same again.**

***PowerPoint*, a
presentation graphics
package from
Microsoft, has quite
simply raised
everyone's
expectations.**

Microsoft's introduction of *Windows 3.0* will have enormous implications for all manner of applications, but most of all for graphical ones. To see what this entails, you need look no further than *PowerPoint*, Microsoft's new entry in the presentation graphics field. This \$495 program, an enhanced version of the Macintosh product by the same name, is the first in the field to really make use of what the *Windows 3.0* environment offers: a consistent graphical user interface, transparent access to all the memory in your PC, and device-independent access to PostScript printers and high-resolution graphics adapters.

The benefits of the *Windows* interface are very real. Unlike its most popular DOS-based competitors, *PowerPoint* lets you manipulate words and pictures in true WYSIWYG mode. Instead of working with multiple menu options and text-entry boxes, you can simply type, draw, and paste objects right on your slides or over-heads. The results are immediately apparent; *PowerPoint*'s design makes it a good deal easier to use for creating great presentations.

WORDS, WORDS, WORDS

PowerPoint's design philosophy of easy, direct manipulation is apparent from slide one. Most slides that people create are word charts, and the default slide that comes up when you first open *PowerPoint* proves just how easy word charts can be. To begin work all you really have to do is select the title box (by clicking on it) and begin typing.

PowerPoint's toolbox provides a number of methods for entering text directly into a slide. Large text blocks, especially if they contain multiple indents, demand the power of the word processing tool, which creates a text frame where you can type text in a predefined format. The tab ruler provides a wonderfully interac-

tive method for setting indents and margins. If you are familiar with *Word for Windows*, you will have no trouble working with the five possible tab stops, or with the visual method used to create hanging indents.

For free-floating text, *PowerPoint* offers a label tool that is invaluable for adding notes to clip-art images and graphs. *PowerPoint*'s ellipse, rectangle, and rounded rectangle tools provide a third way of entering text. Just click on a geometric shape and you get a text-insertion cursor. The completed text is actually part of the graphic, so the two elements can't be inadvertently separated if you decide to modify the design in any way. You can still edit the text, however, and the spell checker will work on it just like on any other piece of copy.

FONT HEAVEN?

No matter what type of text entry you prefer, you'll find that *PowerPoint* makes it easy for you to choose an appropriate typeface and style, using self-explanatory menus. You can even define your own type styles, which include information on the typeface, point size, color, and attrib-

utes (such as boldface or italic) for any text. This feature lets you apply a range of type options to a text block in one fell swoop, a real convenience. But *PowerPoint*'s type styles lack the true power of style sheets in the sense of *Ventura Publisher* or *Microsoft Word* because you cannot accomplish global changes simply by editing the styles menu.

If you install *PowerPoint* for a PostScript printer, you'll automatically have access to the printer's resident Adobe typefaces. *PowerPoint* also accommodates LaserJet users by bundling Dutch, Swiss, and Zapf Dingbats scalable fonts from Bitstream with the program. But be warned; the separate bitmaps for printer and screen fonts eat up an enormous amount of disk space. LaserJet users should expect to devote 16MB of their hard disk just for the program and font files alone.

Needless to say, *PowerPoint* would benefit dramatically from the addition of a type manager that can generate screen fonts on the fly. Until that capability is built into the operating environment (Microsoft is expected to integrate its TrueType scalable font technology into *Windows* eventually), you may want to consider such third-party products as

Adobe Type Manager (to be released by the time you read this) or Atech Software's *Publisher's PowerPak*.

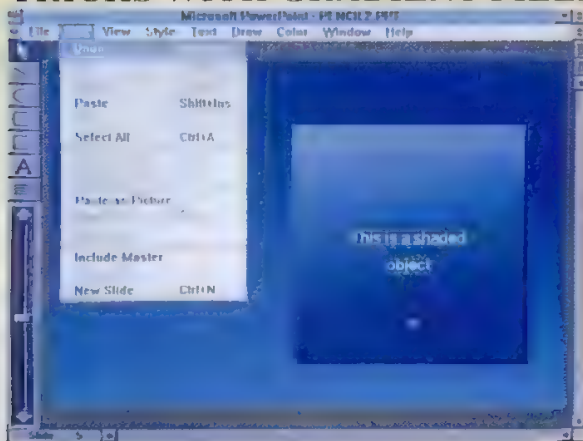
PowerPoint rounds out its text-handling tools with a search-and-replace function and a spell checker that can maintain a custom dictionary in addition to the default dictionary. The spell checker uses *Word for Windows* dictionaries, so you can share dictionaries with that program if you happen to have it. You cannot spell-check the text contained within pictures or graphs, however.

ASSIGNED ATTRIBUTES

PowerPoint is not a drawing program. You can move, resize, and delete the lines, ellipses, rectangles, and rounded rectangles that you create within the program. But *PowerPoint* has no free-hand drawing capabilities, contains no functions for

POWER TIP 1

TRICKS WITH GRADIENT FILLS



1. Open a new slide.
2. In the color scheme dialog box, create a gradient-filled background of any color. Apply the new fill to the current slide only.
3. Draw an object using the graphics primitives (a rectangle, for example). The rectangle should remain selected.
4. On the Draw menu, assign the Opaque attribute to the object. This will force the object to pick up the background fill. Be sure to position the object on the section of the gradation you wish to copy.
5. Copy the object to the clipboard. You now have a gradient-shaded object that can be moved anywhere.
6. Paste the object from the clipboard back into the slide of your choice by using the special command Paste As Picture.

We have all come to associate the gradient-fill backgrounds on slides with the high-quality 35-mm film recorders used by third-party service bureaus. Most PC-based presentation programs are unable to show them on screen, however. But *PowerPoint* has a special menu option just for creating shaded backgrounds, and on-screen thumbnails to help you keep track of them. You can even create shaded objects and place them anywhere in your presentations; just use the Paste as Picture command on the Edit menu. Once you've mastered this impressive little trick, you can achieve more-sophisticated effects by overlapping individual objects with different gradient fills. And if you have an extended VGA card with a 256-color driver, the transitions will appear smooth—you won't see the grainy dither patterns that are necessary with the default 16-color driver.

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combining objects, and does not allow you to rotate, skew, or automatically align images. These limitations are deliberate. Instead of providing drawing tools geared for artists, *PowerPoint* supplies formatting options geared for the average business user. Accordingly, you can assign attributes such as color, fill pattern, drop shadow, and line style to objects with just one or two menu clicks.

Still, there's a lot of power hidden in the tool set. For example, you can double-click on a corner of the marquee box that surrounds a selected object to return to the image's original aspect ratio. And the vertical and horizontal guides have a built-in snap-to function to help you accurately position objects. Moving the guides while holding down the Control key resets the zero point to the guide's new location—in effect turning it into a measuring tool. And if you want to group a collection of objects permanently, you simply group-select them, copy them to the clipboard, and then paste them back into *PowerPoint* using the Paste as Picture function.

If you want to include complex images in your presentation, you can turn to the 400 clip-art images (designed by Genigraphics) that come with *PowerPoint*. Alternatively, you can employ *PowerPoint*'s robust import filters to bring artwork in from other sources. The *Windows* Metafile (.WMF) format is the preferred format since it's fully supported via the *Windows* clipboard. But you can use the Paste From function to pull in vector images in HPGL, AutoCAD .DXF, .EPS, and CGM formats, or bitmapped images in .PCX, Microsoft Paint (.MSP), black-and-white TIFF, *Windows* Bitmap (.BMP), or Device-Independent Bitmap (.DIB) formats.

Though *PowerPoint*'s tools let you resize, crop, and change the colors of clip art, you cannot break a Metafile image down into its constituent elements in order to edit outlines or to individually color objects. This is a serious limitation because it forces you to use another graphics program if

you want to customize *PowerPoint*'s clip art to your needs.

ACCEPTABLE CHARTING

Unlike its Macintosh predecessor, *PowerPoint* on the PC comes with a charting module; you don't have to create your graphs elsewhere before bringing them into your presentations. A separate executable file, the Graph module is launched from within *PowerPoint*, using DDE as an internal transfer mechanism (*PowerPoint* does not support user-defined DDE hot links).

The charting module is a pleasure to work with; just choose the Insert Graph command from the File menu and two windows pop up on screen, so you can see both the data sheet and its graph at once. *PowerPoint*'s data sheet is 127 rows by 127 columns, offering an astoundingly large 16,129 data points. You can enter your data directly, or you can import it from 1-2-3, Symphony, Excel, or SYLK worksheet files, either in their entirety or

as named ranges, including formula results. You can even choose to graph non-contiguous numbers; simply double-click on a column or row header to remove it from the data series.

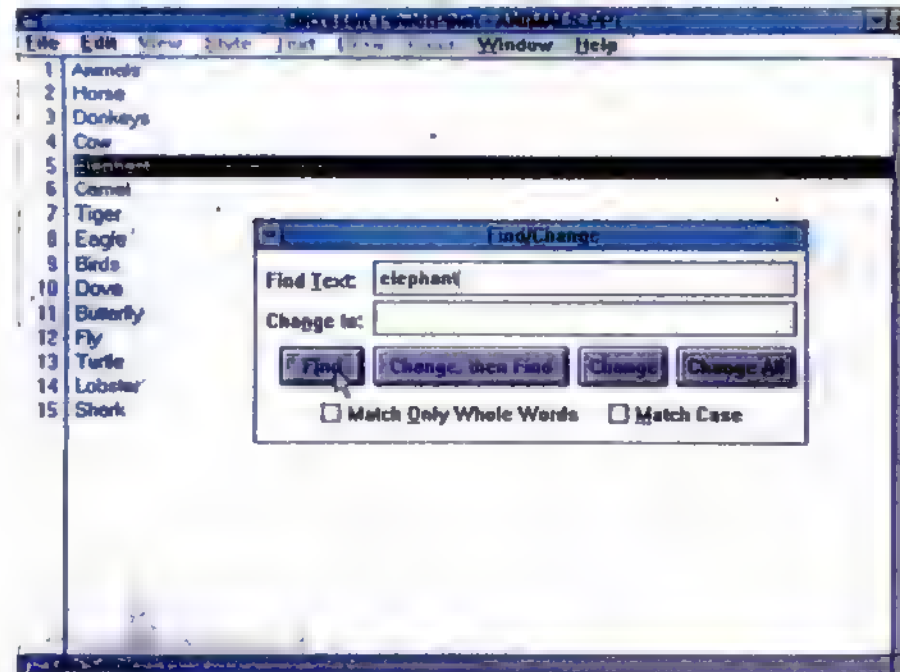
But you'll find a real tradeoff between ease of use and formatting flexibility. For example, to choose among the various styles of area, bar, column, line, pie, or scatter charts, you merely click one of the thumbnails. But you're given only eight color choices, and these have nothing to do with the *PowerPoint* color scheme for the entire presentation. In fact, they are the eight EGA colors—remember light brown?

Similarly, though you can modify the position and size of the legend, you can do so only if you opt to place it within the chart. If you put it in any other position (at the bottom or to the right, for example), it becomes a fixed object that cannot be moved. And you can't determine the position of data labels at all.

Even worse, when you accept the graph and return to *PowerPoint*, you will discover that the chart has been pasted in as

POWER TIP 2

FINDING AND MANAGING CLIP ART



If you are not an artist, you'll really appreciate the 400 clip-art images that come bundled with *PowerPoint*. Incorporating an image into your slide show couldn't be simpler because the Genigraphics clip-art libraries are stored as *PowerPoint* presentations. Just open up a Genigraphics clip art file, copy an image to the clipboard, and paste it into your slide.

Sifting through the clip-art library, however, can be a tedious procedure, primarily because you must wait for the screen to redraw before you can move on to another image. To get around this, use *PowerPoint*'s text-based Title Sorter to dramatically speed up your search time. In addition, you can use the Find menu options as a "go to" command when dealing with clip art.

- 1. Open a clip-art file; for example, the collection of animals.
- 2. Go to the Title Sorter view. Even though no text appears on the slides, each of the images is titled so that you can find the one you want fairly easily.
- 3. Save the file in Title Sorter view. Now each time you open the file it will appear in fast text mode.
- 4. To find a particular piece of art, pull down the Text menu and open the Find/Change dialog box. (The Find command will also work in Slide Sorter and Slide views.)
- 5. Enter the text string to search for "Elephant." *PowerPoint* will search for the title and automatically bring up the slide that contains that title.

You can follow a similar procedure to create your own indexed and personalized clip-art collection within *PowerPoint*.

- 1. Create a new presentation (call it CLIPPED.PPT).
- 2. Import as many images as you wish, with one picture per slide.
- 3. In the default title field, type in a simple description of the image. You may wish to make the title invisible by assigning the same color to both the text and the background.
- 4. Save the presentation in Title Sorter view.

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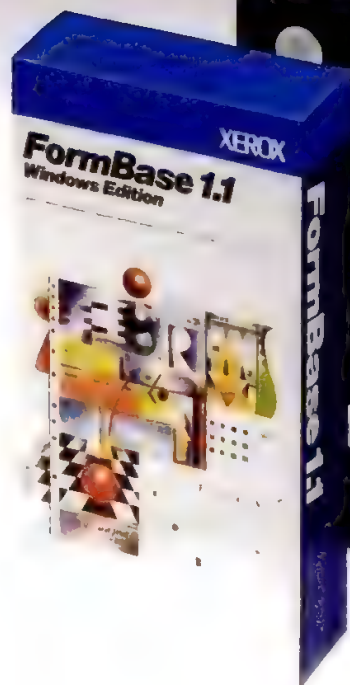
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a linked picture. The only modifications you can make are those allowed for any imported picture—resizing, cropping, repositioning, or recoloring. This can be a considerable inconvenience; in order to move the legend in one of the graphs, for instance, I was forced to copy the entire graph to the clipboard, paste the copy in as a picture, and then use the cropping tool to isolate the legend. To make more-extensive changes, you must go back to the embedded data sheet and regenerate the chart (you do this by double-clicking on the picture). Both *Harvard Graphics* and *Lotus Freelance Plus* are vastly superior on this score; they let you ungroup the elements in a graph or drawing and reformat them individually.

POWERFUL OVERVIEWS

Though *PowerPoint*'s text, drawing, and charting features help you to produce great-looking individual transparencies, the program's real power resides in its ability to create and manage your presentations.

Unlike *Lotus Freelance Plus* and *Harvard Graphics*, which create one slide per file, a single *PowerPoint* file contains an entire presentation, including slides,

speaker's notes, and handout summaries. Never again will you have to go through the extra step of collecting all of your individual slide images into a show list. *PowerPoint*'s single-file system lets your slides, speaker notes, and handouts share images—saving disk space and providing automatic updates to all aspects of your presentation whenever you edit a slide.

Some of *PowerPoint*'s best features are aimed at helping you to build attractive presentations quickly. For instance, you can assign a "master slide" (or master note page, or master handout) to any presentation. Much like *PageMaker*'s master pages, master slides help you create a consistent look for your presentation by repeating graphic elements such as a company logo, customized rules, or standard text boxes on every slide. If the master isn't appropriate to a given slide, you can omit it. You can create an instant template by opening any presentation as an untitled copy, and setting default text and drawing styles is almost effortless.

Creating the basic outline of your presentation is equally fast. Though *PowerPoint* does not have a built-in outliner, it

does accept outlines from *Word for Windows* directly, allowing you to create the text slides of an entire presentation—properly formatted—in a single operation. You can also import outlines in suitably formatted ASCII files (see *PowerTip* 3, "From Outline to Slide Show").

Once you've created your presentation, you can get a good look at the whole thing by switching into one of *PowerPoint*'s two overview modes. The Slide Sorter shows detailed thumbnail versions of each image, while the Title Sorter lists all of their headlines and is a bit faster to redraw. In either case, it's a snap to reorder the sequence of your slides—simply click and drag a title or a miniature to a new location. It's also easy to borrow slides from other presentations; because you can open multiple presentations simultaneously, copying slides between presentations is a simple clipboard operation rather than an elaborate procedure.

EASY HARD COPY

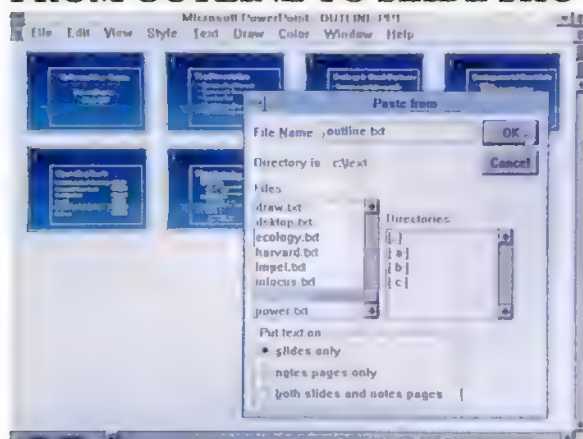
Although most of your presentations will probably consist of black-and-white overhead transparencies produced on laser printers, the temptation to use color slides may just be too hard to resist once you see

how easy they are to create with *PowerPoint*. Color selection is normally one of the trickiest parts of creating a slide presentation, but Microsoft, in partnership with Genigraphics, a nationally based slide service bureau, makes the process foolproof.

PowerPoint presentations are based on a simple color scheme of eight hues. Change any of the eight colors in the color scheme, and you can apply the changes to every one of the slides—in effect remapping the colors of the objects throughout the entire presentation. You needn't feel constrained by the eight standard colors, however. You can add eight more color choices, which you can apply to objects on a case-by-case basis. This helps to ensure that your colors are consistent throughout the presentation.

If the thought of choos-

POWER TIP 3 FROM OUTLINE TO SLIDE SHOW



When you have a single slide on screen, the Paste From command automatically searches for graphics files on the disk. But in either Title Sorter or Slide Sorter view, this same command lets you paste text files (saved in either ASCII or Rich Text Format) into your *PowerPoint* presentation. Because *PowerPoint*'s text import filter looks for tabs, you can use it to partially overcome one of *PowerPoint*'s main shortcomings—its lack of a text outliner. (You can also directly import *Word for Windows* outlines.) Of course, if you change the text of your outline later, you'll have to make the changes directly on the slides, or else reimport the entire outline. But this method can save a lot of time in starting your presentation.

■ 1. Create an outline in your favorite word processor. You can use up to five different levels of indentation—*PowerPoint*'s maximum. Use hard carriage returns to designate the end of each paragraph, not each line (this is the only difficult part to master and may require some trial and error). Insert the appropriate number of tab stops for the various indents within each paragraph.

■ 2. Save the outline as a pure ASCII text file.

■ 3. Load *PowerPoint* and prepare a template for your presentation. The master slide should include your logo, any rules, and specs for the title box, and default setting (such as typestyle and indents) for a secondary word processing box.

■ 4. Go to the Slide Sorter view and use the Paste From command on the File menu to bring in the ASCII file that contains the outline. *PowerPoint* will automatically create a separate slide for each main-level heading and will indent the subsequent copy based on the number of tab stops in each paragraph. You can create up to 50 slides with a single ASCII text file.

■ 5. Go back to each slide and fine-tune the formatting.

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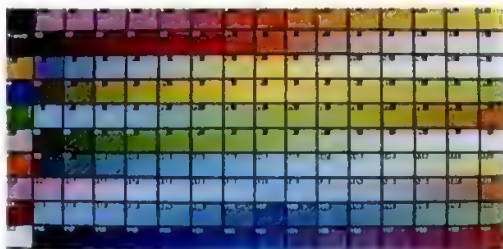
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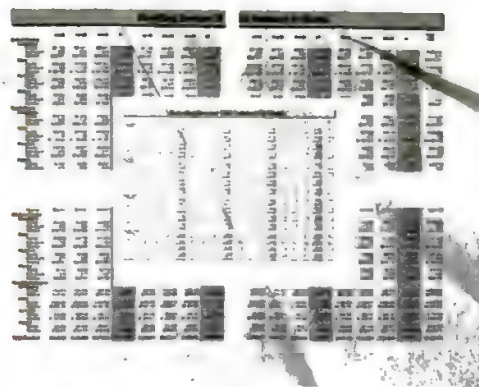
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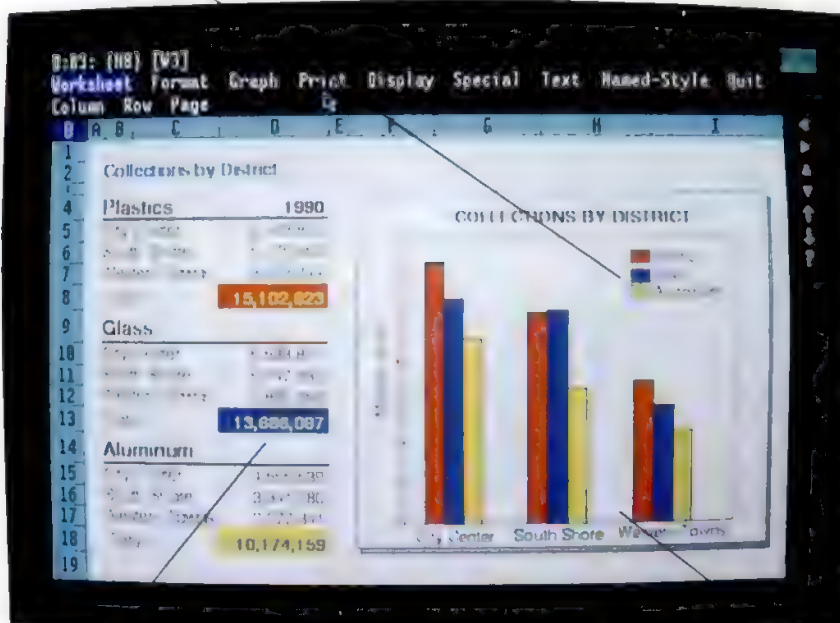
Q4	1989
2,415,407	6,886,910
1,987,897	5,573,029
1,331,601	3,789,665
5,734,905	16,249,604
3,610,029	12,880,958

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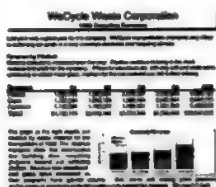
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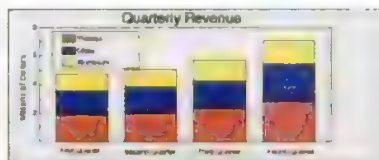
Last year was a good year for the company. WeCycle was profitable and came very close to achieving our goals in a very uncertain economic and recycling climate.

Revenue by Product

Material collections increased over the year. Plastics continue to bring in the most revenue and profit for the company. Prices for aluminum are still very soft and while we're continuing to collect more glass, markets for the raw material are still in their infancy.

Revenue	Q1	Q2	Q3	Q4	1990
Plastics	1,800,785	1,982,024	2,378,397	2,838,963	9,000,169
Glass	1,700,504	1,862,135	1,888,430	2,600,684	8,051,753
Aluminum	1,148,864	1,182,022	1,489,421	1,801,763	5,422,070
Total	\$4,650,153	\$5,026,181	\$5,756,248	\$7,241,410	\$22,850,440

The graph at the right details our revenue by waste material for the four quarters of 1990. The revenue increases show that communities are building their recycling programs beyond just collecting plastics. Revenue from aluminum and glass have increased as their programs have gained volume. But, we're still seeing price pressure as the supply of recyclable materials continues to exceed the demand. We need to look for ways to expand our markets and increase the use of recycled materials.

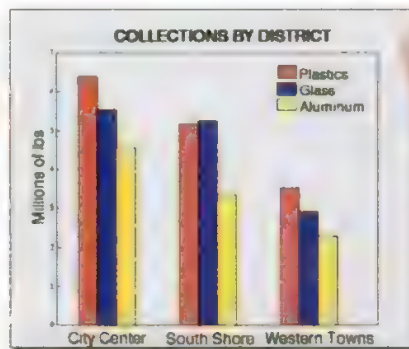


Collections by District

Plastics	1990
City Center	5,403,829
South Shore	5,175,450
Western Towns	3,523,344
Total	14,102,623

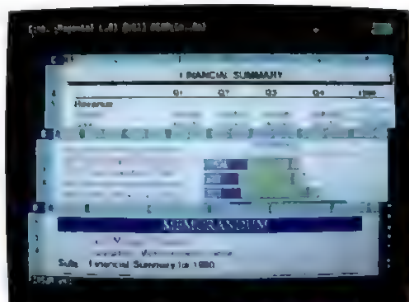
Glass	1990
City Center	5,538,612
South Shore	5,247,930
Western Towns	2,699,356
Total	13,485,898

Aluminum	1990
City Center	4,555,538
South Shore	3,341,280
Western Towns	2,277,341
Total	10,174,159



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ing colors that match strikes fear into your heart, relax. Genigraphics has worked out a palette creation system for *PowerPoint* that even colorblind presenters can love. The color selection dialog box begins by presenting only background colors. Once you've picked one, you get a selection of several foreground colors that are guaranteed to be legible on that background. Choosing a foreground color then brings up a series of coordinated accent colors. One more mouse click completes your basic palette.

The Genigraphics palette recommendations are quite varied, and you may never need to wander outside of them. But if you do, *PowerPoint* does give you two more flexible methods of choosing and creating colors. Opting for extra hues, or changing one of the items in the color scheme brings you to a secondary dialog

But if you own an extended VGA card (such as Video Seven's V-RAM VGA adapter) that has a 256-color *Windows* 3.0 driver, you can display all of the 256 simultaneous colors that *PowerPoint* supports on a single slide. Though slower to update, this gives eye-catching results, showing clear distinctions between different shades of the same color and lending smooth transitions to gradient fills in your slide backgrounds or clip art. If you do a lot of work with color slides, a 256-color video card is a must-have.

SHOW TIME

PowerPoint tries to make the difficult task of generating high-quality output as painless as possible. To help you create your slides, Genigraphics supplies a spe-

Our experience with Genigraphics was quite satisfactory. With the exception of one glitch, traceable to the fact that the *Windows* Metafile format does not support irregularly shaped gradient fills, the slides were perfect. The Genigraphics printer driver is smart enough to generate a list of exceptions when you print a slide file to disk. This report will alert you if you use fonts in your presentation that are not supported by the Genigraphics film recorder, and also if you attempt to use the area outside of the acceptable printing range. It even specifies page numbers so that you can more easily go back to the problem slide and make corrections.

Using the Graphics Link successfully requires only that you know your address, your deadline, and your credit card number. The program contains all of the necessary communication parameters—as

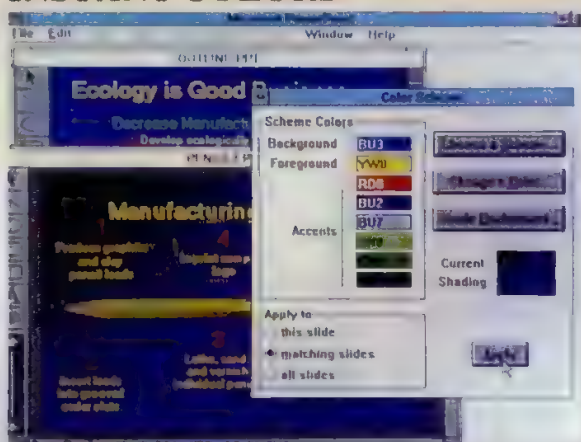
well as Genigraphics's toll-free number; an electronic form prompts you for the handling and billing information. Right now, the program cannot communicate in the background, but Genigraphics is working on a new version that will and also let you include Encapsulated PostScript (.EPS) images in your slides.

Even color presentations require black-and-white output, if nothing else but to do speaker's notes and handouts. *PowerPoint* lets you install a separate output device for speaker's notes, so that you can print them on your laser printer without changing the device you'll use for producing the slides. A simple check in the printer dialog box lets you reverse the gray tones

of the slide images. This has the effect of increasing legibility because it inverts the slide image from light text on a dark background to dark text on a light background. For even better legibility, you can simply apply a black-and-white color scheme to your presentation.

The paltry screen-show facility is the one area in which *PowerPoint* has no excuse for its shortcomings. You can use keyboard commands to navigate through a screen show out of sequence, but jumping around erratically will give you very slow screen redraws because *PowerPoint*

POWER TIP 4 INSTANT COLORS



1. Open the presentation that contains the color scheme you wish to copy.
2. Open the Color Scheme dialog box, which will contain the palette of the current presentation. Leave it open on the screen.
3. Now open the presentation to which you want to copy the color scheme.
4. Click on the All Slides option and then Apply the color scheme to the new presentation.
5. Close the Color Scheme dialog box by double-clicking on the control menu icon in the upper-left-hand corner.

The graphical interface conventions of *Windows* 3.0—such as cascading menus, drop-down list boxes, and modeless dialog boxes—provide additional functions to *PowerPoint*'s feature set. *PowerPoint*'s Color Scheme option, for example, appears in a modeless dialog box, which can be displayed continually while you work on one or more presentations. This makes it convenient to change colors quickly and also makes it possible to easily copy a palette from one presentation to another.

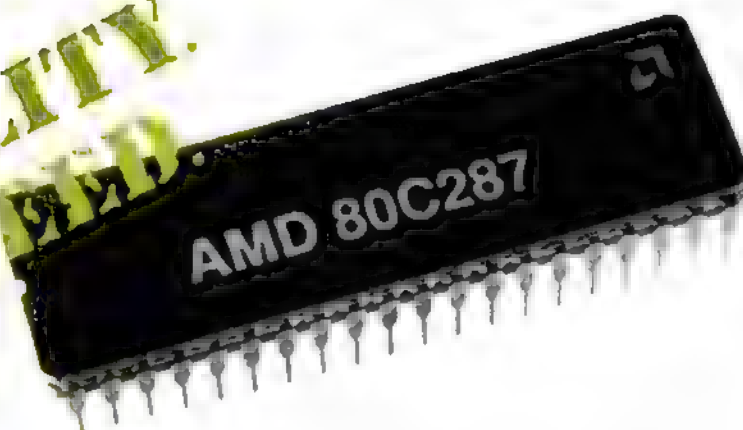
box that contains a matrix of 90 colors specifically chosen to provide a close match between your VGA screen and the Genigraphics film recorder. Our test presentation proved that you can trust these selections. If you have a real need for custom colors, another function lets you mix your own (using the hue/saturation/luminance model) from the total palette of 16 million.

Under *Windows* 3.0's standard 16-color VGA driver, most of the colors appear in a dithered form, requiring trial and error to match screen colors to output colors.

cial printer driver plus the Graphics Link, a proprietary communications program that lets you send the company your slides. Genigraphics provides Economy, Standard, or Rush turnaround, and prices for slides and overhead transparencies range from \$9.95 to \$19.50 per image, depending on how quickly you need to have the slides processed. If you already have a working relationship with another slide service bureau, you'll have to decide if the tradeoff is worth it—at the moment, Genigraphics is the only direct-to-slide vendor that *PowerPoint* supports.

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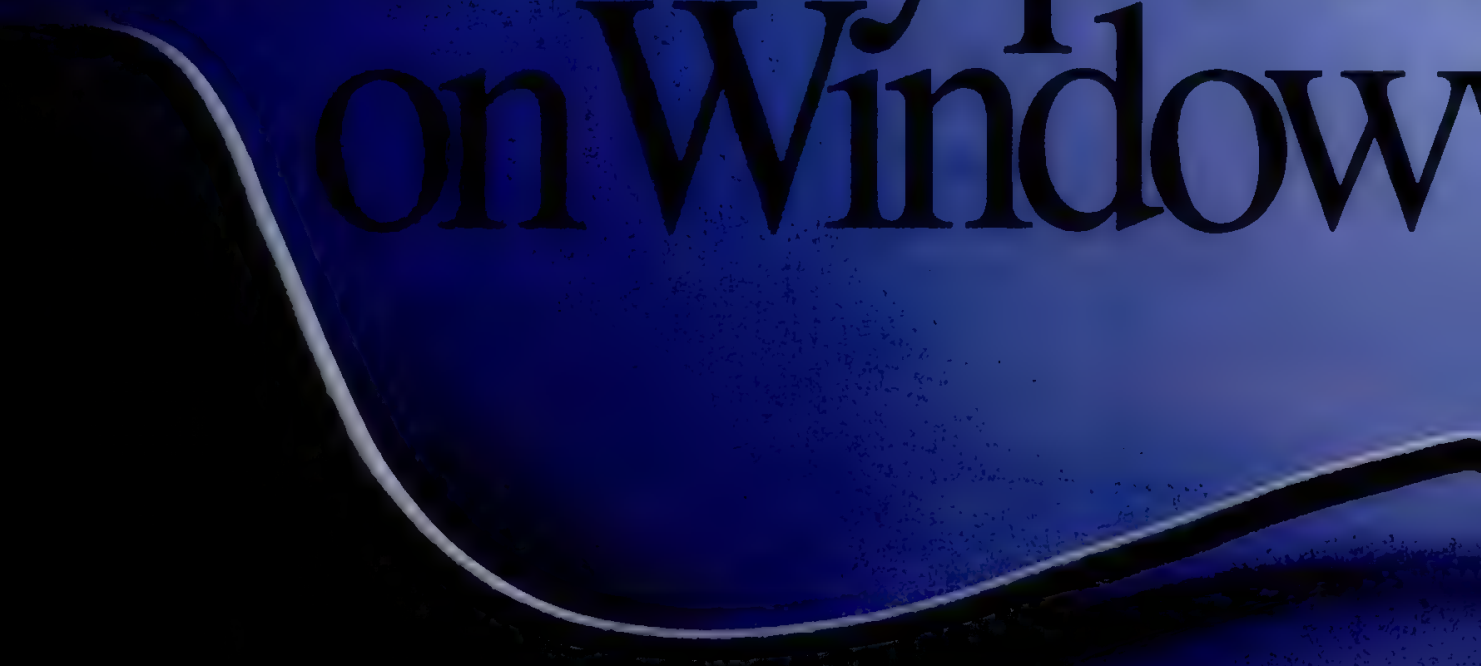
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GRAPHICS MICROSOFT POWERPOINT

assumes a forward-progressing presentation and caches consecutive images in memory. You cannot assign transition effects or script different display times for each slide. And since a screen show requires a full version of *Windows* and *PowerPoint* in addition to the presentation itself (the overhead of duplicating the *Windows* environment precludes a run-time screen-show module), it's impos-

sible to distribute a presentation on a floppy disk or other convenient medium.

A NEW AGE

PowerPoint's philosophy—embodied by master slides, templates, and fail-safe color schemes—is a definite step up when it comes to managing slide and overhead presentations. Its robust *Word for Windows*-like word processor gives you great flexibility when designing individual slides. And creating simple graphs in the *Excel*-like charting module is a breeze. The downside is that those features require a substantial hardware investment. A 386-based PC with 4MB of RAM, a fast, high-resolution graphics adapter, and a whole lot of free disk space is a practical necessity.

As long as you can meet the minimum hardware requirements and are content to stay within the prescribed limits of the program, you can produce great-looking overheads and slides. The fact that there are no surprises between your VGA screen and final output is perhaps the program's strongest selling point.

However, venturing beyond those limits is difficult—sometimes impossible. If you constantly update a text-based presentation by editing an outline, for instance, you'll find that *PowerPoint*'s workaround import scheme just doesn't compensate for the lack of a built-in outliner. And anyone who needs to present complex data sets will find the formatting options of the Graph module frustratingly limited. Finally, the Genigraphics slide service bureau is currently your only option for direct 35-mm. output.

In time, *PowerPoint* will gain some stiff competition from other presentation products running under *Windows 3.0* and *Presentation Manager*, notably the long-rumored PC version of Aldus' *Persuasion*. Whether these products are direct Macintosh ports like *Persuasion* or new versions of your favorite DOS-based graphics programs, they will have to offer some major improvements. Because by the time they are released, we will all be addicted to the ease of use and high-quality output offered by *PowerPoint*. ■

Luisa Simone is a contributing editor of *PC Magazine*.

FACT FILE

Microsoft PowerPoint
Microsoft Corp., One
Microsoft Way,
Redmond, WA 98052;
(800) 426-9400, (206)
882-8080.
List Price: \$495.
Requires: IBM AT, PS/2, or compatible; 1MB
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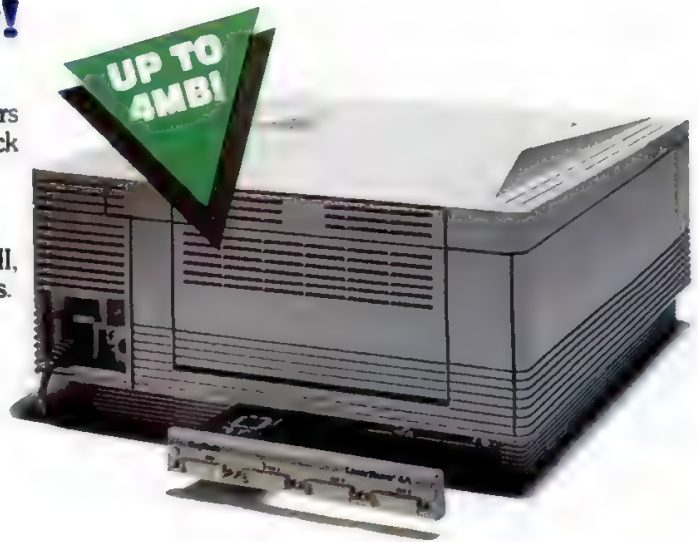
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Moves Into The Mainstream

By Lori Grunin

Successful optical character recognition is no longer a costly option for specialized uses. You can now get excellent accuracy from OCR software packages, which use industry-standard PCs and scanners, that range in price from \$250 to \$1,000. In addition, the results from our tests show wide variations in the capabilities of the ten products reviewed here.



Offices may be growing more computerized, but the death of paper has been greatly exaggerated. Many businesses would love to convert their filing cabinets jammed with letters, documents, and random scraps of paper into searchable word-processing files and databases: hence the interest in optical character recognition (OCR), the process by which a computer turns a scanned image of a page into modifiable text.

GRAPHICS OCR SOFTWARE

But OCR used for a broad range of tasks demands real computing power. Every page has to be loaded into memory and broken down into a series of steps—the text separated and ordered properly, and the type and its attributes recognized by means of complex algorithms. Not surprisingly, the first OCR systems were predominantly based on specialized machines with integrated, high-accuracy scanners and dedicated recognition hardware. In high-volume environments such systems, costing upwards of \$10,000, still flourish.

The IBM AT, with its 16-bit expansion bus and higher clock speeds, made relatively accurate and reasonably fast OCR possible in a PC environment. But until recently, the best PC-based OCR systems (notably Caere's original *OmniPage* and Calera's *TrueScan*) required a proprietary coprocessor card to handle image buffering and recognition tasks. The board added a cost premium that disqualified these packages from addressing the needs of a

large part of the market. Meanwhile, less-expensive, software-only products have offered competent recognition, but they're less accurate than the board-based packages and less capable of handling the complex multicolumn document with embedded graphics.

The increasing popularity of 386-based PCs changes things entirely. The extra processing power and memory capacity of the 32-bit 80386 processor makes it possible for OCR software developers to offer the same recognition capabilities without the coprocessor board. OCR still requires an enormous slice of the typical PC's resources, but the way is open to making OCR a part of every office.

REVIEW CRITERIA

In this article, we take a look at ten software-only OCR systems that work with industry-standard PCs and page scanners—without a coprocessor board.

These include four high-end packages—*OmniPage/386*, *WordScan Plus*, *Recognize!*, and *SPOT*—all with automatic page decomposition and graphics-handling capabilities. But since most ordinary office documents are not that complex, our review also includes three OCR packages capable of handling multiple columns by other means (*ReadRight*, *Perceive*, and *Read-It! OCR*), and three that are incapable of handling multiple columns at all (*Carets Deluxe OCR*, *PC OCR Plus*, and *Advantex*).

A number of other OCR products were not shipping at our review time but should be available by the time you read this. The most notable of these is the PC version of *Accutext*, a high-end, 386-only OCR package from Xerox Imaging Systems. There's also *CAT Reader Professional* from Computer Aided Technology, *ReadStar 6* from Inovatic, and the OCR component of the integrated scanning software *Image-In*. Finally, Hewlett-Packard will be offering *AccuScan*, OCR software based on Calera Recognition Systems' technology, as a \$595 option with its ScanJet Plus page scanner.

WHERE IT ALL BEGINS

All of these products use industry-standard desktop scanners as a way of getting documents into the system. The growth of desktop publishing has created an environment conducive to growth in the OCR market as well; it has supplied a large installed base of relatively inexpensive 300-dot-per-inch scanners, and these offer enough resolution for accurate recognition of the most-common typefaces and sizes. We tested with the market-leading Hewlett-Packard ScanJet Plus, but most packages support units from Canon, Microtek, and Panasonic, and all accept TIFF files from other scanners. Most of these scanners offer automatic document feeders as an option for easier scanning of long documents.

Performing OCR with a standard page scanner is a matter of expedience rather than optimization. While 300-dpi resolution works fine for most fonts larger than eight points, for smaller type sizes the result is an excessive number of joined characters, since the scanner can't always find that single line of white pixels separating two characters. For very small typefaces (four through eight points) and thin characters, you really need a 400-dpi or higher model. These are not exorbitant in cost—Panasonic's FX-RS307U, for



OCR SOFTWARE: SUITABILITY TO TASK

Our suitability-to-task scores are informed subjective ratings for various tasks to help you decide what's right for your application. For a complete picture of what each product offers, compare these ratings with the reviews, the features table, and the performance tests.

THE TASKS

Each OCR program is rated according to its overall suitability for three types of documents.

Monospaced Text is a measure of the product's overall ability to scan-in typewritten or computer-printed office documents. An adequate score means that the product produces good results on regular-size monospaced fonts, such as the Courier typeface produced by laser printers and typewriters, without lengthy training. Good performance on small fonts, the ability to handle landscape and underlined text, and the ability to read dot matrix output are also important factors in the overall score.

Proportional Text rates the product's suitability for handling laser-printed office documents in ordinary proportional fonts. An adequate score means the package offers good performance on typical serif (Times Roman) and sans serif (Helvetica) proportional fonts. The ability to read landscape text, to handle boldface and underlining, and to handle multiple fonts per page and retain character enhancements are also important considerations.

Complex Documents is a measure of the package's ability to handle multicolumn documents printed in a variety of fonts and weights. An adequate score indicates the ability to handle multicolumn text, either through defining regions or through templates, while ignoring graphics and other extraneous portions of the page. The ability to decompose the page automatically, to ignore or save graphics separately, and to retain the format of the original document via stylesheets are pluses.

THE RATINGS

Unsuitable				
Poor				
Adequate				
Good				
Excellent				

instance, lists for \$1,599 (plus \$299 for the interface). But not all OCR software supports these higher resolutions and the extra data they require.

Resolution is only one of the issues. Custom OCR scanners are also optimized for contrast and have special paper-feed-



ing and alignment options for production

use, to minimize the possibilities of distortion. Though they cost less, standard page scanners put a greater burden on the recognition software to compensate for their lesser-quality scans.

the letters, numbers, and symbols in a given typeface. During a typical training

session, the software displays the image of each character and you type the letter to which it corresponds. The result is a font image file that can be saved for use with other pages with the same kind of type.

Though simple in concept, trainable packages have serious drawbacks in practice. The initial training process is tedious and time-consuming. In most cases, you must train each size of each typeface separately, and even when the package comes with pretrained fonts, recognition can be stymied by slight variations in type style. Though some trainable packages use various methods of shortening the training cycle (such as interpolating a font table from a different size of the same typeface, or from a similar typeface), these innovations don't always work very well.

JACK OF ALL FONTS

Not surprisingly, the better packages rely on so-called "omnifont" technology, which uses feature extraction (also known as topological recognition or intelligent character recognition) to discern letters independently of their specific shapes. In this scheme, the system breaks down each character into its constituent parts (lines, curves, angles, ascenders, and descenders) and compares the result with its database of character information. This is a way of looking at character results in a nearly unlimited font vocabulary for the package.

Omnifont technology produces far-more-accurate results with less work and tedium than trainable packages, and omnifont packages are better at reading multicolumn documents with graphics as well. They generally (though not always) command higher prices, but the cost differential between omnifont and trainable packages is negligible in view of the performance differences. And the accuracy of omnifont software on oddball fonts can be bolstered by incorporating trainability as a supplementary option, as in Ocron's *Perceive*. In the future, purely trainable packages will probably be relegated to the

EDITOR'S CHOICE

- OmniPage/386
- WordScan Plus

The results of our OCR software tests show wide swings in performance, from near-perfect to almost-useless. But the best packages come up to a remarkably high standard.

Our Editor's Choice goes to *WordScan Plus* from Calera Recognition Systems and Caere's *OmniPage/386*, which came in neck-and-neck on the most important measure of OCR ability: accuracy. The design of Calera's brand-new \$995 product comes closest to the ideal of hands-off recognition. It handles pages of any format, and although its heavy-duty algorithms cost a bit in terms of speed, its deferred processing capabilities make this relatively unimportant; you can simply put your documents in the scanner and walk away until they're finished. If you really need a speed boost and have the money to pay for it, you can get a coprocessor-based version for \$3,995.

OmniPage/386 from Caere (\$895) rates a close second to Calera's product in features, but more importantly, it has that killer combination of speed and accuracy. If raw speed is your primary goal, it may be your preferred choice. And an upcoming *Microsoft Windows* 3.0 version definitely bears watching.

Finally, an honorable mention goes to *ReadRight*. Challenging the

A SCANNER IN THE HAND

What about hand scanners? The low cost of these products make them of great interest to a wide range of users, and several of the OCR packages in our review have hand-scanner versions. While 400-dpi hand scanners are abundant, and software such as Logitech's *CatchWord* supports this resolution, you have good reason to be cautious. Getting a scan straight enough for OCR can be difficult, and any OCR software used with them must be fine-tuned to handle excessively skewed characters. Furthermore, scanning full-sized pages, even with packages that can join several scans together before recognition, is time-consuming. Users who combine low-cost OCR software with the variability of hand-scanned input are sure to emerge from the experience frustrated and disappointed.

Moreover, developments in the hand-scanner category threaten to make this issue obsolete. By the time you read this, Caere should have shipped *PC Typist*, a \$595 hand scanner with *OmniPage*'s smarts built into it. It will allow you to scan, recognize, and place text into any application in a single pass. And by the end of this year Mouse Systems will be releasing *PageBrush*, a \$795 PC version of its Macintosh-based hand scanner that uses absolute rather than relative position tracking, thus eliminating the skewing problem. Such innovations should make it possible to use ordinary OCR software reliably without shelling out for a full-page scanner.

SLOW LEARNERS

Even assuming the best of all possible scans, not all OCR software is created equal. Some software performs far better



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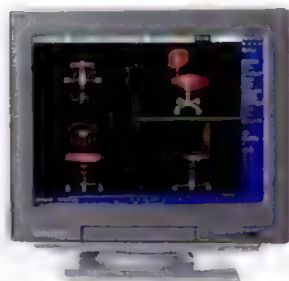
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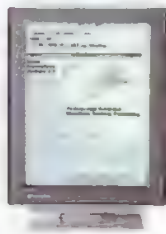
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packages. Most packages tend to make more of some types of errors than others, so keep this in mind as you read through the reviews. For instance, if you want to use the recognized text as part of a text database, extra spaces between words and wrong punctuation aren't terribly important, whereas if you're publishing the same results in a desktop-published newsletter, removing the extra spaces and punctuation errors might be a real pain.

Some of the elements of type design that make text easier on the eye and more attractive to read can befuddle omnifont and trainable packages alike. Tight kerning and ligatures are always problematic, especially for trainable packages, which use rectangular outlines to separate characters. And fractures such as those in degraded photocopies can cause single characters to be interpreted as two or three. Dot-matrix print poses a related problem, since the dots that make up the letters often don't touch. However, since this type of print forms regular patterns, OCR software such as *WordScan Plus* and Caere's *OmniDraft* add-in for *OmniPage* incorporate a connect-the-dots capability to compensate.

Underlining is a universal challenge for OCR software, which has problems disentangling descenders from underlines, turning ys into vs and commas into periods. And environmental influences, such as stray marks and coffee stains, can cause the software to erroneously interpret marks as characters.

TO ERR IS INEVITABLE

When the software isn't sure of a character's identity, it may flag the character as unknown or it might make a guess as to what the character is likely to be. Some OCR packages (such as *WordScan Plus*) incorporate lexicons, built-in dictionaries that check the spelling (and make a stab at the context) of a word before making a decision about it.

But most OCR output error-checking occurs after the fact. The most-common proofreading tool is the spell-checker in your word processing software. Unfortunately, such spell checkers won't catch errors like punctuation marks inserted in the middle of words, misrecognized punctuation marks, substitution errors that result in real words, or spacing errors, although grammar checkers can make an attempt at correcting these problems. Some OCR packages, such as Caere's *OmniSpell* add-in for *OmniPage/386*, perform

spell-checking especially attuned to OCR-related errors; for instance, since *c* is often substituted for an *e*, if *cerie* were the error, the program might suggest *erie* as an alternative.

Some errors simply take time to correct. Scanning numeric information, for instance, requires great care, because every character is critical, and it can't be spell-checked mechanically. Though we did not explicitly test numeric recognition, the more-accurate packages should do a fine job of reading numbers, and some even offer a "numbers only" mode to improve your chances even further. But you still have to proofread and double-check the figures. Getting the results into a usable worksheet file can also be a bit tricky; many packages can save the file into a .WK1 format, but they don't always accurately space the columns, throwing off the cell addresses and making the entire worksheet worthless.

Other things are simply impossible with today's technology. Many people would love a package to scan in the contents of forms for data-entry use, for instance. But recognition algorithms can't differentiate between the text and the box surrounding it in any useful way. And there's still no accurate way to recognize handwritten form entries.

A HUNGER FOR POWER

OCR is now far more accessible than it once was, but it isn't exactly cheap. You'll need at least a 286-based system with lots of free disk space, and unless your documents are relatively simple, count on a fast 386 system with 2MB to 4MB of RAM. And, of course, a page scanner, preferably with an automatic document feeder, is a necessity. OCR work will eat up your entire machine, unless you get a coprocessor card to allow background processing. Still, many offices have comparable equipment now, and the remaining components are widely available at competitive prices.

For more-demanding applications, technological developments have the potential to improve OCR even further. RISC technology, for instance, can boost horsepower for more-complex and effective recognition algorithms, and has already been implemented in such high-end systems as Xerox Imaging Systems' Kurzweil K-5200, which, for \$19,950, combines a combination sheet-fed and

flatbed OCR scanner with a RISC-based coprocessor card. Parallel processing shows even more promise. Caere's new Parallel Reader, a 386SX-based turnkey system that sells for \$10,095, comes with no less than four Motorola 68020 processors. Working together, they let the system continue to scan pages while others are being decomposed and recognized, improving the throughput of the system.

Faster and more-powerful CPUs and wider buses will eventually make PC-based OCR accurate and speedy enough to make it truly attractive to a wider market of office users. In the long run, the ability to take an image of a document and turn it into working text should be an innate function of most sophisticated word-processing applications. But you needn't wait until the technology fully matures; today's OCR systems offer practical benefits today.

Advantex

by Alfred Poor

Advantex from Solution Technology comes with font tables for 23 different fonts, trains fairly easily, and supports more than a dozen scanners, all for just \$395. But although close-to-the-mark may work for horseshoes, it's not enough for an OCR program.

Suitability to Task

Monospaced Text	☒	☐	☐	☐
Proportional Text	☐	☐	☐	☐
Complex Documents	☐	☐	☐	☐

At first glance, the program has the right earmarks. Its font tables cover all the standard type styles (Times Roman, Helvetica, Courier, Avant Garde, Palatino, ITC Zapf Chancery), plus some more-unusual ones, such as Old English. According to a company representative, *Advantex* employs a combination of spatial abstraction and holographic recognition techniques, and the company claims the program can read characters as large as 60 points, or (when scanned at 400 dots per inch) as small as 6 points.

If the specific font you need is not included, you can train the package to

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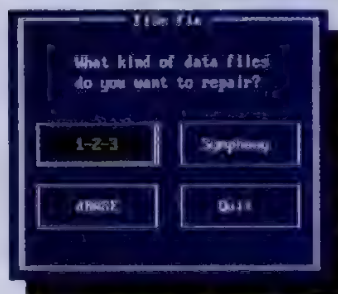
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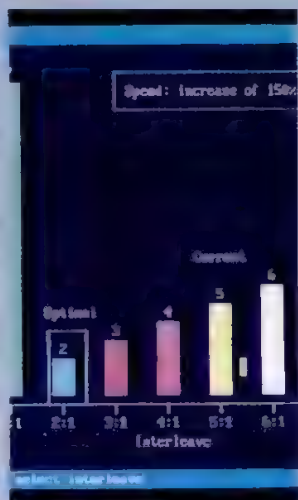
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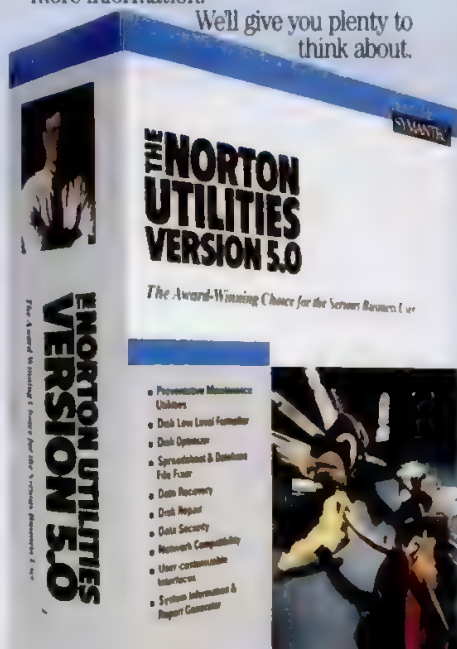
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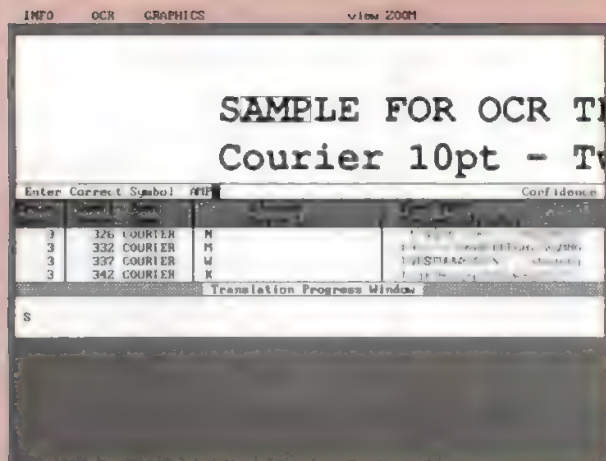


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GRAPHICS OCR SOFTWARE

Carets Deluxe OCR

by Mitt Jones



Advantex is fairly easy to train, but its accuracy is poor when the characters are touching because of ligatures, wicking, or insufficient scanning resolution.

learn a new set of characters. It offers a number of training options, some of which can make the teaching process quite fast. For example, the program defaults to its Autoskip mode, which does not stop for any characters that the program recognizes with a certain level of confidence. This saves lots of time once the font becomes more completely defined, although you risk skipping over misrecognized characters.

TUNNEL VISION

But these positive signs are belied by the program's poor performance—it made numerous errors on almost all of our test pages. *Advantex* cannot distinguish individual letters when the characters are touching. We were unable to get good results from our print samples even after adjusting the program's scanner brightness controls. The program is incapable of reading underlined text, since the underscore connects all the letters, and it did

poorly on dot-matrix output. It cannot read landscape pages at present, so we had to skip those test pages entirely.

Advantex runs under DOS, with a windowed interface of its own design, vaguely reminiscent of *Windows* and *GEM*; it was not hard to master. However, I was surprised to find that *Advantex* does not support a mouse in the standard fashion. If you have a programmable mouse, you can use it to simulate the effects of the cursor arrow keys, but this falls far short of what you should expect for a product in this class. Using the keyboard to mark text regions for conversion is tedious at best.

GRAPHICS GRUMBLES

The program is not good at handling multiple columns. To scan a multicolumn document, I had to define each of the columnar regions separately, then append the scanned results. It also has problems handling embedded graphics. Although *Advantex*'s manual claims that the program can distinguish graphics from text automatically, in our tests it attempted to recognize the PC Labs logo on our test page. I had to use the graphics editing features built into the program to erase the logo before converting the image.

A company representative claimed that the program works better on difficult type samples than easy ones. But in our tests, *Advantex* did not prove to be particularly good with any of them. The company is planning an upgrade soon, with a *Microsoft Windows* version due out before the end of the year. It needs to be greatly improved if the company expects it to be real competition for the stronger packages in this category.

The conscientious software reviewer tries to convey the advantages of a package as well as its shortcomings. Unfortunately, finding any true advantage in Pattern Analytics' *Carets Deluxe OCR* is akin to finding the cheery side of the national debt.

The problems with this \$249 DOS-based package are due in part to its sole reliance on pattern recognition techniques. *Carets Deluxe OCR* comes with a small collection of pretrained fonts, including four HP LaserJet fonts and nine IBM Displaywriter fonts, plus a smattering of others, but the program must be trained to recognize any other size or typeface. Spend a few hours training fonts that other packages understand straight out of the box, and you'll easily see why OCR software vendors are moving to omnifont algorithms.

MISSING PIECES

Carets also suffers from what can only be described as poor implementation. Despite a few nice features, such as the

Suitability to Task

Monospaced Text	☒	☐	☐	☐
Proportional Text	☐	☐	☐	☐
Complex Documents	☐	☐	☐	☐

ability to run the program with preset configurations from batch files and an option to flag letters of questionable identity, the strongest impression that *Carets* makes is from what it lacks. It cannot recognize multiple columns, it cannot recognize landscape text, and it cannot recognize text larger than 14 points or characters other than *M* and *W* that are wider than 03.1 inches. And since it cannot recognize more than one font per page, preserving boldface and italic text is out of the question.

In our tests, *Carets* proved to have great difficulty recognizing tightly spaced fonts and proportional laser-printer output. Worse yet, *Carets Deluxe OCR* cannot recognize more than a prespecified number of characters per line. While the

FACT FILE

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List Price: \$395
Requires: IBM AT or compatible, 640K RAM,
hard disk, DOS 2.1 or later.

In Short: This trainable package is rich in features, but it has real trouble with ligatures and touching characters. It performed poorly on almost all of our tests, and poor mouse support is an additional detraction.

CIRCLE 410 ON READER SERVICE CARD



Over 4 billion characters read.

Without a doubt, ReadRight 2.01 is the best-read OCR software ever to hit the books.

In fact, more than 60,000 people use ReadRight to scan text into their PCs. No other DOS-based OCR software comes close, because no other OCR software does as much, as well, as ReadRight. For under \$500. Facts that led Seybold Report to say, "ReadRight impressed us in virtually all areas."

And we think you'll feel the same. First, about what PC/Computing called ReadRight's "impressive recognition accuracy" of up to 99.5%.

And its ability to recognize just about every font known to the business world. Right out of the box. Thanks to its proven omnifont technology.

Plus you don't have to upgrade your system to get started. ReadRight 2.01 runs in just 640K. On a standard IBM® PC or compatible.* With no additional hardware or memory required.

ReadRight isn't fussy about form, either. It reads it all. From typewritten memos and typeset articles, to laser, NLQ and draft dot matrix printed documents.

It even detects paragraphs, indents and tabs. Preserves columns, lists and tables. And understands bold and underlined characters.

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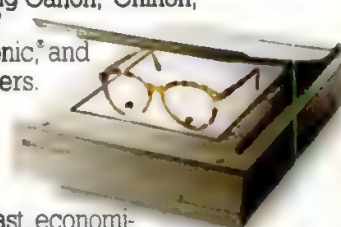
the way you want. Quickly and intact.

ReadRight 2.01 also supports most popular scanners, including Canon®, Chinon®, Hewlett-Packard®, Microtek®, Panasonic®, and Ricoh®, among others.

ReadRight software is available for hand scanners, too, in a brand new version called ReadRight Personal.

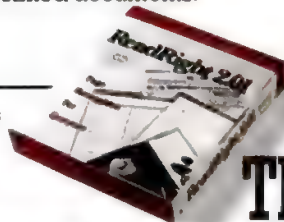
So, if you're looking for a fast, economical way to optimize your PC's reading skills, scan with the OCR software that's seen it all. Call for the name of the ReadRight dealer nearest you and get a demonstration today. **(800) 233-4627**

CIRCLE 362 ON READER SERVICE CARD



*Running DOS 3.0 or higher

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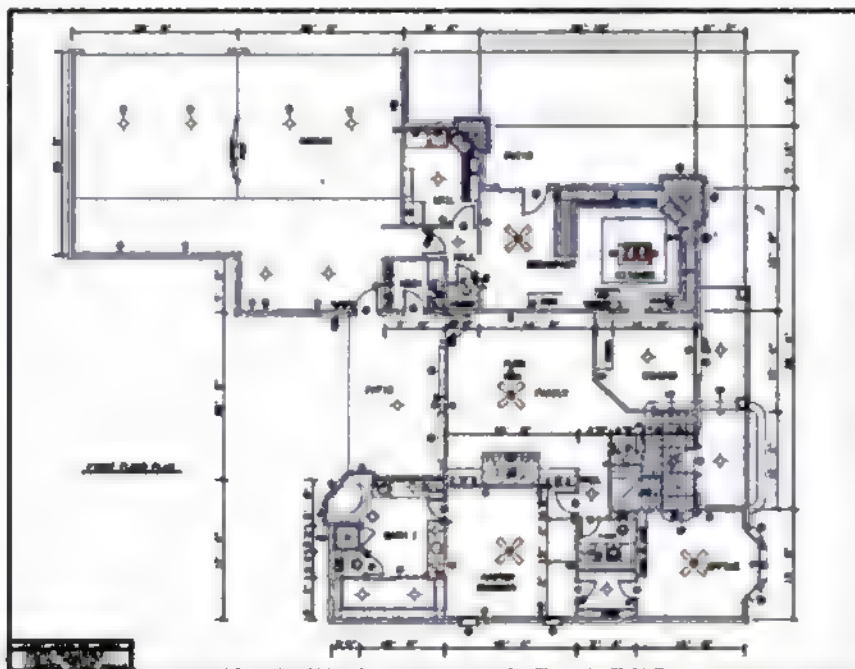


#1 The 1 OCR software.

ReadRight 2.01

OCR Systems, Inc., 1800 Byberry Road, Suite 1406, Huntingdon Valley, PA 19006 • (215) 938-7460 • FAX (215) 938-7465

WHAT MAKES A BEST

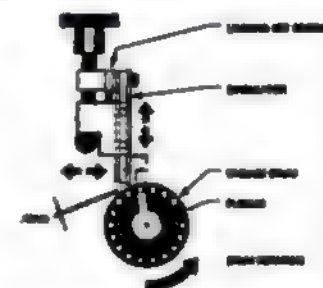


A great plot begins with a great idea, easily translated through every phase of design with Generic CADD 5.0.

OPERATIONAL SKETCH

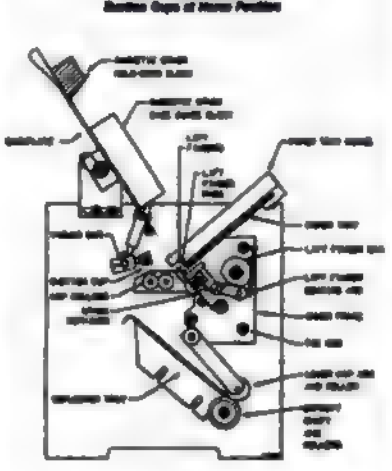
OPERATIONAL SKETCHES

The operational sketch is a preliminary drawing of the design, used to communicate the design to the client or to the design team. It is a rough sketch, not a finished drawing. It is used to show the design team the design and to get their input. It is a rough sketch, not a finished drawing. It is used to show the design team the design and to get their input.

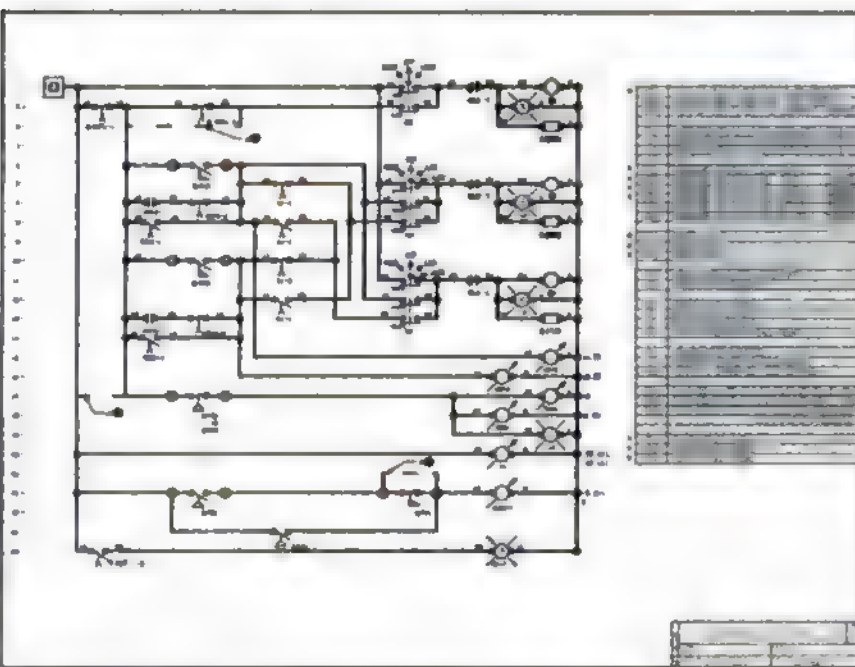


TECHNICAL DRAWING

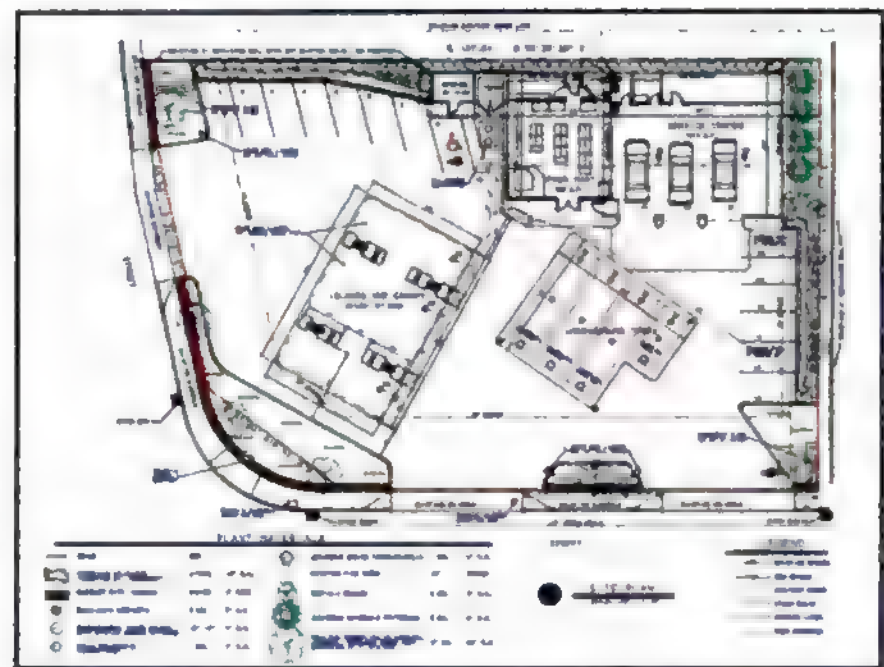
TECHNICAL DRAWING



Exchange your DXF™ files with other CAD systems or insert designs into desktop publishing programs to create technical illustrations.



No matter the complexity, symbols keep your work flowing uninterrupted. Tap our professional libraries or create your own symbols.



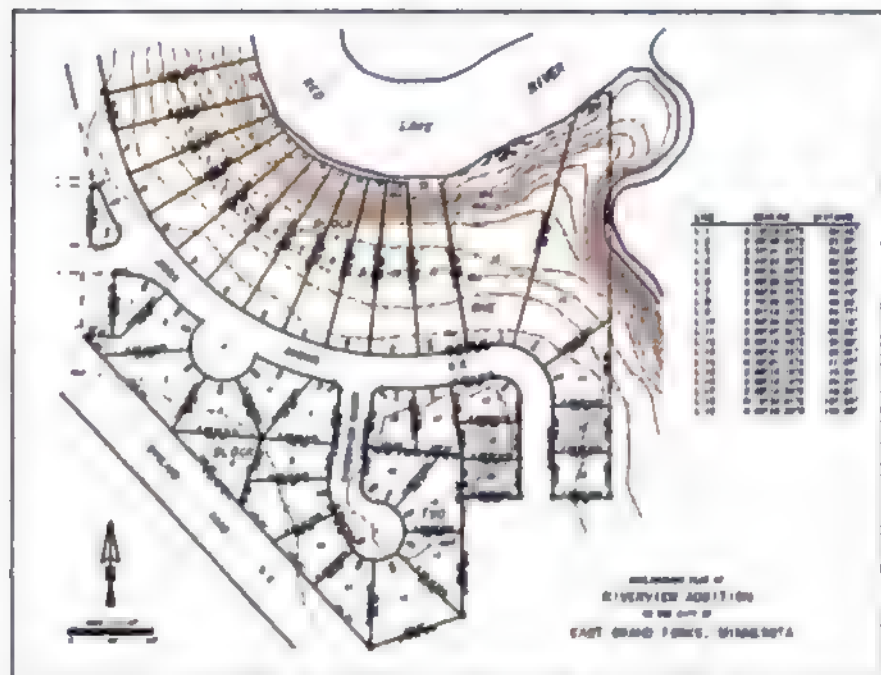
Need to fit a conventional design in a nonconventional space? Revise and improvise in less time with Generic CADD's one-stop convenience.

A GREAT

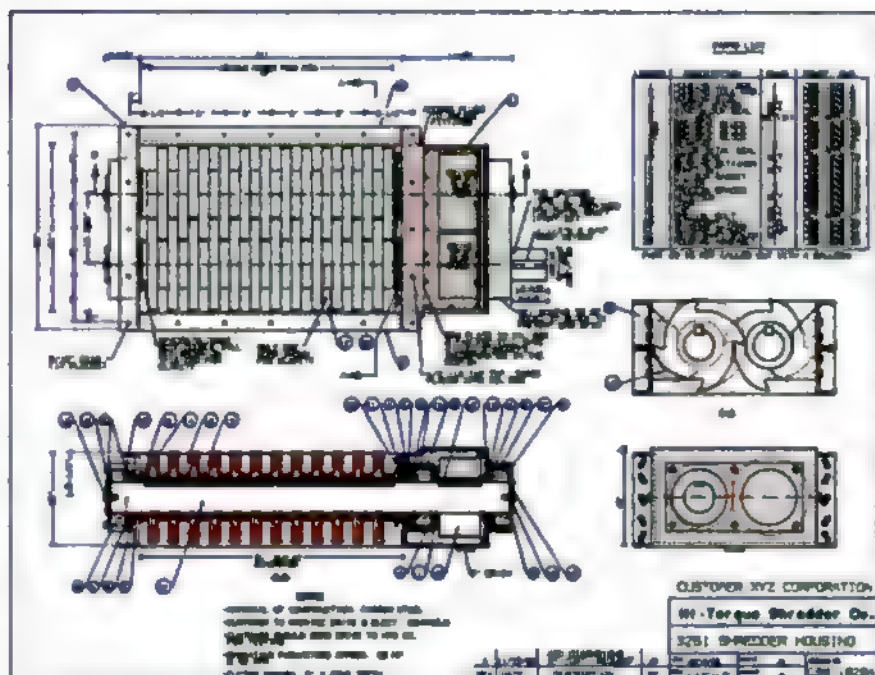
Ask any of over 250,000 users of Generic CADD.™ They've discovered CADD that's powerful without being complicated. And professional without being pricey.

Our latest version, Generic CADD 5.0, is just \$395. It's a complete design and drafting program backed by a support team that's drawing rave reviews.

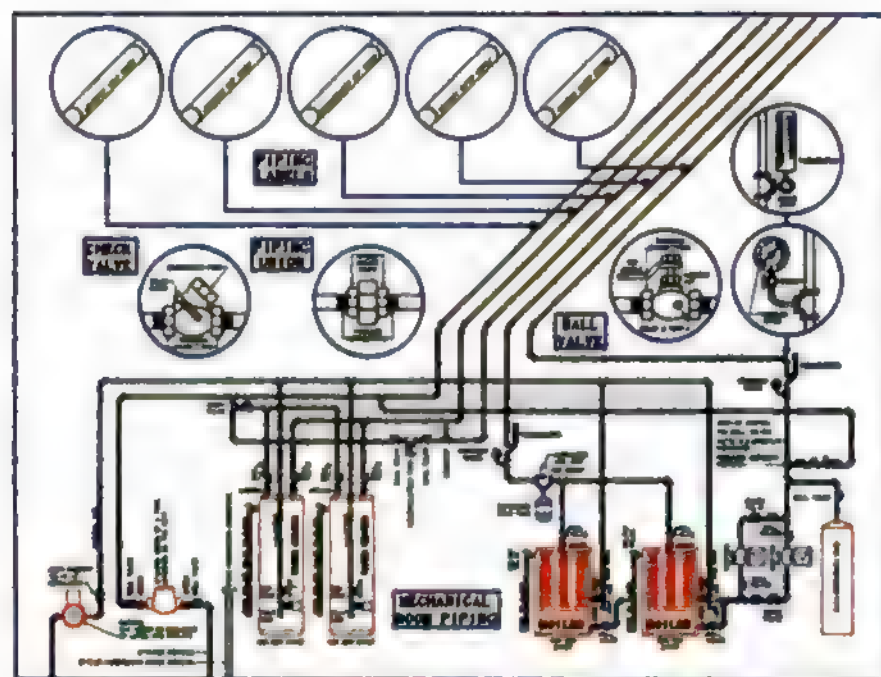
A BEST SELLER SELLER?



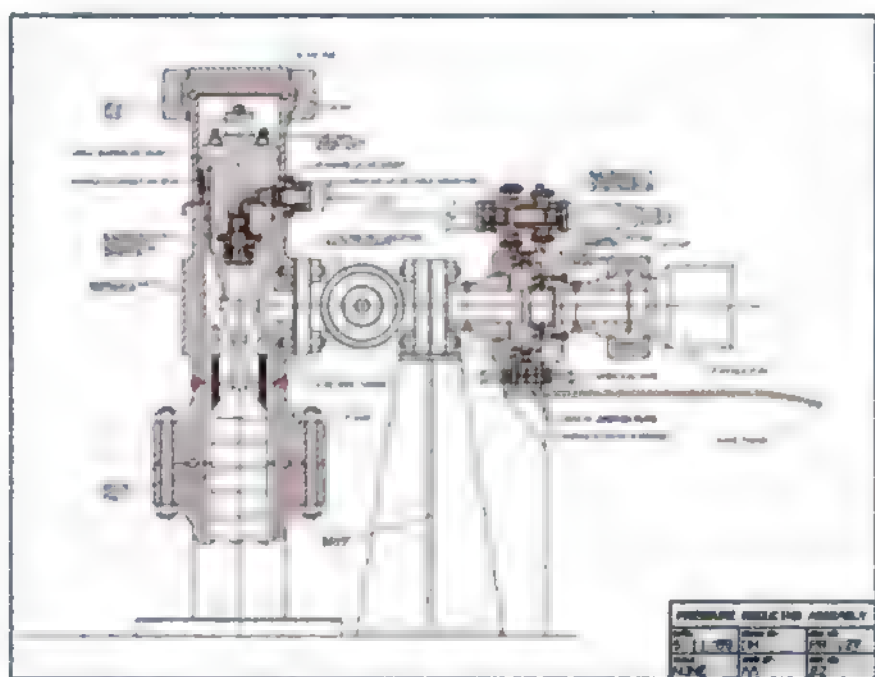
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SOFTWARE

An Autodesk Company
CIRCLE 506 ON READER SERVICE CARD

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GRAPHICS

OCR SOFTWARE



SUMMARY OF FEATURES: OCR SOFTWARE

Products listed in ascending price order

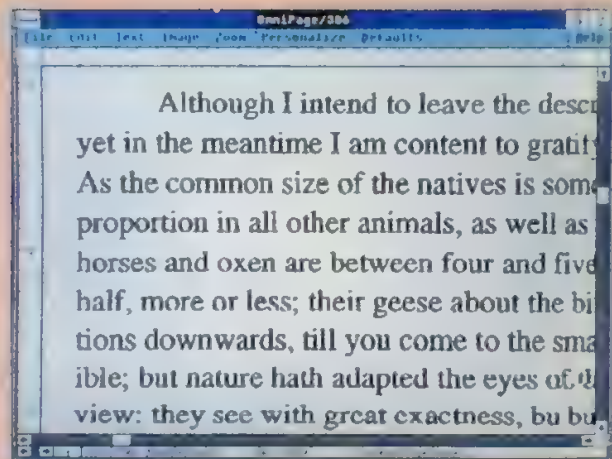
List price	Carets Deluxe OCR \$249	PC OCR Plus \$385	Advantex \$395	Read-It! OCR \$495	ReadRight \$495	Recognize! \$695	SPOT \$695
TEXT RECOGNITION							
Omnifont	☐	☐	☐	☐	☒	☒	☐
Trainable	☒	☒	☒	☒	☐	☐	☒
Must specify font families	☐	☒	☒	☐	N/A	N/A	☐
Minimum/maximum point sizes	6-14	6-14	6-70	6-72	4-24	8-18	6-24
Reads landscape text	☐	☐	☐	☐	☒	☒	☐
Reads foreign characters	☒	☒	☒	☒	☐	☐	☒
Retains formatting:							
Boldface	☐	☐	☐	☐	☒	☐	☐
Underline	☒	☐	☐	☐	☒	☒	☐
Italics	☐	☐	☐	☐	☐	☐	☐
Superscript	☐	☐	☐	☐	☐	☐	☐
Subscript	☐	☐	☐	☐	☐	☐	☐
Line spacing	☐	☒	☐	☐	☒	☒	☐
Spaces to tabs	☒	☐	☐	☐	☒	☒	☒
User-selectable placeholder character	☒	☐	☐	☐	☒	☒	☐
PAGE DECOMPOSITION							
Handles multicolumn text	☐	☐	☐	☒	☒	☒	☒
Automatic order	☐	☐	☐	☐	☐	☒	☒
User-specified order	☐	☐	☐	☒	☒	☐	☒
Templates	☐	☐	☐	☒	☒	☐	☒
Reads text on pages with graphics	☐	☐	☒	☒	☐	☒	☒
SCANNING OPTIONS							
Page scanners supported:							
Canon	☐	☒	☒	☒	☒	☐	☒
Hewlett-Packard	☒	☒	☒	☒	☒	☒	☒
Microtek	☐	☒	☒	☒	☒	☒	☒
Panasonic	☒	☒	☒	☒	☒	☐	☒
Ricoh	☒	☒	☒	☐	☒	☐	☒
Hand scanner version available	☒	☒	☒	☒	☒	☒	☒
Accepts TIFF file input	☒	☐	☒	☒	☒	☒	☒
Previews scanned image	☐	☐	☐	☒	☒	☒	☐
Adjusts preview window	☒	☒	☒	☒	☒	☒	☐
Sets dithering	☐	☐	☐	☐	☐	☒	☐
FILE-SAVE CAPABILITIES							
Text formats							
Ami/Ami Professional	☐	☐	☐	☐	☒	☐	☐
ASCII (hard carriage returns)	☒	☒	☒	☒	☒	☒	☒
ASCII (paragraph markers only)	☒	☒	☒	☒	☒	☒	☒
Document Content Architecture (DCA)	☐	☐	☐	☐	☒	☒	☒
Microsoft Word	☒	☐	☐	☐	☒	☒	☐
MultiMate	☒	☐	☐	☐	☒	☒	☐
PFS:Professional Wnte	☐	☐	☐	☐	☒	☒	☐
Q&A Wnte	☐	☐	☐	☐	☒	☐	☐
Rich Text Format (RTF)	☒	☐	☐	☐	☒	☒	☒
Windows Write	☐	☐	☐	☐	☐	☐	☐
Word for Windows	☐	☐	☐	☐	☒	☐	☐
WordPerfect	☒	☐	☒	☐	☒	☒	☒
WordStar	☒	☐	☒	☐	☒	☒	☐
XyWrite	☒	☐	☐	☐	☒	☐	☐
Data formats:							
ASCII	☐	☐	☐	☒	☒	☐	☐
.DBF (dBASE)	☐	☐	☐	☐	☒	☐	☐
.WK1 (Lotus 1-2-3)	☐	☐	☐	☐	☒	☐	☐
.XLS (Microsoft Excel)	☐	☐	☐	☐	☒	☐	☐

☐—Editor's Choice ☒—Yes ☐—No

N/A—Not applicable: the product does not have this feature.

* This feature is available at additional cost.

GRAPHICS OCR SOFTWARE



OmniPage/386 distinguishes itself for both speed and accuracy. Its character window helps you to catch and correct contrast problems during recognition.

After examining the white space on the scanned image of the document and determining its boundaries, *OmniPage* goes on to define the areas that might contain text. On the screen, you'll see this represented by one or more sections of text enclosed in a box and numbered to indicate the order of processing. You can manually renumber all the blocks if the product made a mistake, but most of the time you won't find this necessary. During recognition, a character window shows an enlarged view of the current section of the document, allowing you to gauge the severity of any contrast problems.

IMPRESSIVE SPEED

OmniPage/386 is no slouch when it comes to performance. On every one of our test documents, it managed to average under one minute per page, uniformly the fastest in our tests. And though it's not quite as accurate as *WordScan Plus*, it breezed through almost all our test pages; with the exception of the Courier Landscape and HP Line Printer tests, its accuracy ratings were excellent. Although it often read underlined commas as periods, it had no serious trouble with underlined text. One of its few failures occurred on the dot-matrix test; *OmniPage/386* alone isn't designed to handle it. Caere offers an add-in called *OmniDraft* (\$100) that lets *OmniPage* work with dot matrix print and other fractured characters.

Aside from the usual brightness settings for the scan, it also lets you define

as—and more cost-effective than—the original version of the software, which requires a coprocessor board and costs \$1,295.

OmniPage/386 runs under *Microsoft Windows/386*, and Caere supplies a runtime version of *Windows* in case it is not installed on your machine. In any case, you should count on having a fairly beefy equipment setup; you'll need a fast 386-based PC with at least 4MB of system memory, plus 7MB of free space on your hard disk to store the programs and any temporary files. *OmniPage/386* supports a number of standard page scanners, including models from Abaton, Canon, Hewlett-Packard, and Microtek.

TWO WAYS TO SCAN

Since *OmniPage/386* relies on omnifont recognition technology, you need not do any preparatory work; just load a page into your scanner, pull down the Text menu and select Scan. The first of two scanning choices recognizes text alone, ignoring any graphical elements on the page. The second recognizes both text and graphics, letting you scan in pages at the rate of about 16 seconds per page to be saved for later processing. This setting saves the image in uncompressed or compressed TIFF format, which means that you should be able to recognize TIFF files created by any scanner. Experimentation proved that this works quite well.



SUMMARY OF FEATURES: OCR SOFTWARE

Products listed in ascending price order

Carets Deluxe OCR PC OCR Plus Advantex Read-It! OCR ReadRight Recognize! SPOT

TEXT AND GRAPHICS EDITING

Text editor	■	✓	□	■	□	□	■
Moves blocks	□	✓	□	■	□	□	■
Performs search-and-replace	□	✓	□	■	□	□	■
Has spell-checker	■	□	□	□	□	□	□
Graphics editor	□	□	■	□	□	□	□

MISCELLANEOUS

Runs under Microsoft Windows	□	□	✓	■	□	✓	□
Expanded memory support	□	□	■	■	■	■	■
Extended memory support	□	□	✓	■	■	□	■
Mouse support	■	□	□	■	✓	✓	■

DOCUMENTATION

Tutorial manual	■	□	■	■	■	■	□
On-line tutorial	□	□	□	□	□	□	□
On-line help	□	✓	✓	□	□	■	■

□—Editor's Choice ■—Yes □—No

N/A—Not applicable: the product does not have this feature.

Suitability to Task

Monospaced Text	100%	200%	300%	4
Proportional Text	100%	200%	300%	4
Complex Documents	100%	200%	300%	4

When you're done, you have the option of editing any errors that might have occurred; most will be flagged automatically. You can save the recognized text in any of several popular word-processing formats, as well as ASCII. Should you want to do your proofing and correction work in an *OmniPage* environment, you'll need to acquire *OmniSpell* (\$100) and *OmniProof* (\$150) to do so.

OmniPage/386 remains one of the best OCR packages on the market, though it's no longer unique in its prowess. Its speed makes it the best choice for high-volume environments, and it matches its competi-

[illegible]

FACT FILE

EDITOR'S CHOICE

OmniPage 386
Caere Corp., 100
Cooper Ct., Los
Gatos, CA 95030;
(408)
395-7000, (800) 535-7226.
List Price: *OmniPage 386*, \$895; *OmniSpell*,
\$100; *OmniProof*, \$150; *OmniDraft*, \$100.
Requires: 386-based PC, 4MB RAM, hard
disk, mouse, DOS 3.1 or later, *Microsoft*
Windows 386
In Short: This software-only version of our
Technical Excellence award winner still takes
the prize for speed, but it's not the most
accurate package. Its interface and feature set
could use some enhancement.

CIRCLE 412 ON READER SERVICE CARD

by Bruce Brown

PC OCR Plus is a trainable package that compares badly with the programs in this roundup. This \$385 program comes with more than 20 pretrained fonts, but its performance is severely limited by a throwback interface and inadequate training capability.

Essex Software Publishing describes *PC OCR Plus*'s recognition algorithm as "99 percent pattern recognition" with a little bit of topological function built in.

Whatever its emphasis, it doesn't work very well. The only test samples on which *PC OCR Plus* performed acceptably were the 100-percent and 90-percent black Courier 10-point Postscript samples, and the IBM Proprinter draft-mode sample. The software either misrecognized characters or skipped them entirely with every other sample, including the LaserJet Courier, Times Roman, and Helvetica test suites.

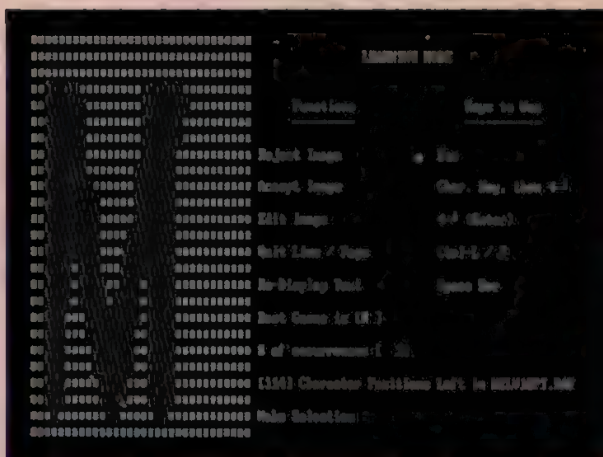
Worse yet, the first version we tested had the tendency to abort the translation process when the number of exceptions became too great. A subsequent maintenance release was much improved in this regard, however.

SEVERELY LIMITED

The list of "don't do's" goes on. During our tests we found that *PC OCR Plus* can't be trained to recognize underlined or landscape text. It can't parse multicolumn samples in a single pass. And it doesn't work with point sizes less than 6 points or greater than 13 points. The program saves scanned and recognized text only in ASCII format; there's no chance of bringing work into word-processing program formats with print enhancements intact. Scan our test page with mixed fonts? Forget it.

Essex Publishing says that most of its users work with the pretrained fonts and hire Essex to train new fonts when they need them. The current charge for this service is \$35 per hour, and Essex claims that it takes no more than one hour to train a new font. But even the representative who came to PC Labs had little luck in training the software to adequately recognize several of the commonplace samples in our pack of test pages. Our advice? If you have to train it, skip it.

PC OCR Plus is designed to handle both monospaced and proportional fonts, but in practice it had a difficult time learning practically any font.



Monitors, Modems,



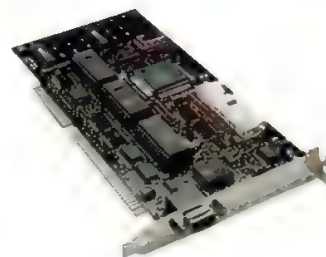
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Horizontal	up to 38KHz		up to 38KHz
Vertical	up to 90Hz		up to 90Hz
Maximum Resolution	1024 x 768 interlaced		1024 x 768 interlaced
Display Colors (Analog)	unlimited		unlimited
Display Area!	13" diagonal		13" diagonal
Power Consumption	75 Watts		90 Watts
Dimensions (DXWXH)	14.8" x 14.5" x 14.2"		16" x 14" x 14.3"
Adaptability	VGA, 1024 x 768, 8514A		VGA, 1024 x 768, 8514A, plus older modes

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1 MB Dip 80/100ns
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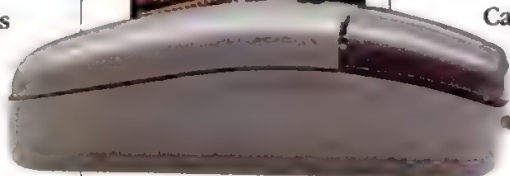
1 MB Sipp 80/100ns
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(with MNP-5)

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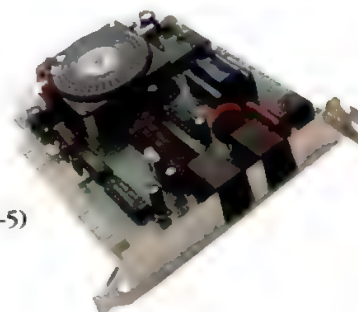
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PC Brand, Inc. 964 W. Washington St., Chicago, IL 60607
International Fax #312-633-2888 International Voice #312-226-5200. We are open Mon. thru Fri.: 7am to 7pm; Sat.: 8am to 4pm Central Time. MasterCard, VISA, Discover, PC Brand Direct Advantage MasterCard, Checks and Approved P.O.s are Accepted. Prices and specifications subject to change. PCM 9-18A CIRCLE 386 ON READER SERVICE CARD

Suitability to Task

Monospaced Text	☐	☐	☐	☐
Proportional Text	☐	☐	☐	☐
Complex Documents	☐	☐	☐	☐

STONE AGE

PC OCR Plus's top menu is a simple list of formats that is easy to use for selecting fonts, point sizes, and scan settings. Once you've chosen all the options you can save the scanning parameters as a format file for use with later input documents that have the same parameters.

Yet the interface requires that you configure your system to use ANSI.SYS if you want to be able to read the menus. Even worse, if you need to adjust some of the program's finer settings, such as modifying the parameters of font files, you must use DEBUG to make the changes! The manual indicates that most users won't have to go to this step, but any end-user program that requires DEBUG as a standard operating tool is ten years behind the times.

Essex Publishing claims several thousand satisfied users among those who work with monospaced fonts on typed and dot-matrix copy. But in our tests, *PC OCR Plus* failed to recognize quite ordi-

FACT FILE

PC OCR Plus

Essex Software Publishing Inc., P.O. Box 391, Cedar Grove, NJ 07009; (201) 783-6940. List Price: \$385.

Requires: IBM AT or compatible, 256K RAM, hard disk, DOS 2.1 or later.

In Short: The primitive interface, limited functions, and ineffective performance of this trainable OCR package make it a poor choice for any purpose. Not recommended.

CIRCLE 413 ON READER SERVICE CARD

nary fonts—even after extensive training. Given the program's lack of flexibility, it's hard to see any reason to buy it.

DIFFERENT STROKES: Handwriting Recognition on PCs

by Alfred Poor

The problems facing systems that recognize handwriting are unique and separate from those confronting OCR. Handwriting is quite different from typewritten or printed text. Type is composed of static characters with uniform shapes and predictable spacing, but handwritten characters offer little uniformity in either shape or spacing, making recognition a different game altogether. However, a computer has an advantage over OCR because it can "watch" the handwritten letters take shape. For this reason handwriting recognition on PCs is no longer an elusive goal.

By substituting a pad and stylus for a keyboard, computers can use stroke sequence analysis to detect characters as they take shape. The direction and order by which each line segment is formed adds information that the computer can match to known patterns.

The Sony Palmtop and Canon Ai Note are products (sold only in Japan) that use a handwriting interface to recognize a number of the thousands of different characters used in handwritten Japanese. Since the Japanese schools consistently teach a single set of penmanship skills, the stroke sequence matching method yields highly reliable results. American handwriting is not so consistent, however. As a

result, most designs that handle English handwriting are limited to capital letters in block printing only. There is nothing in the technology that prevents the use of lowercase letters, except that there is so little uniformity in the way people write them. However, within the next year more products that add lowercase recognition are expected to appear on the market.

Many systems rely on sophisticated pattern-matching algorithms, often based on the same concepts used in designing neural network computers. The Sony Palmtop uses "fuzzy logic" to identify characters. Though this technology can make products somewhat more accurate, you must still write each character in a separate box so that letters do not touch. And you'll still need to learn how to write so the system can understand you, rather than the other way around. And you thought that you left penmanship lessons behind in the third grade!

SPECIAL PURPOSES

Not surprisingly, most of the handwriting recognition systems available today are aimed at very particular tasks, such as field data collection. Perhaps the best known in this class is the GRiDPad from GRiD Systems Corp. (a subsidiary of Tandy Corp.) of Fremont, California. The GRiDPad is a 4.5-pound notebook computer, which

you use a stylus to write (in block capital letters) on a 5-inch LCD screen. The company provides C and Clipper libraries so that you can write your own applications.

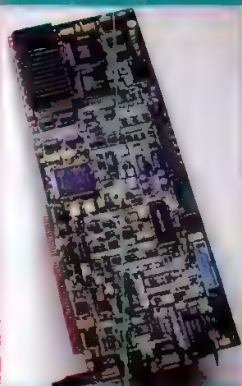
The Scriptwriter from Data Entry Systems in Huntsville, Alabama, is a kind of intelligent clipboard on which you enter data by filling in the blanks on a paper form. The data is stored in an ASCII file that you can dump into your PC for processing. The Handwriter from Communications Intelligence Corp., located in Menlo Park, California, is a digitizing tablet that you hook to your PC. It sends recognized characters to your computer as if they were entered on a keyboard, so you can use it with most popular applications.

The Go Corp. of Foster City, California, is reported to be working on a new generation of laptop computers that can recognize handwriting. And IBM researchers have already demonstrated their "Paperlike Interface" that will supposedly recognize letters that touch, and will even handle cursive script.

The degree to which this technology can be applied to the more-complicated task of recognizing handwriting on paper is an open question. But if you long for a simple ballpoint pen and a stack of foolscap in place of your keyboard, your wait may soon be over. ■

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Key Problems in OCR

by Lori Grunin

Numerous type attributes and styles complicate OCR software's ability to read printed matter accurately.

Boldfaced characters

(10-point Courier)

Here, the combination of capitalization and boldfacing renders the letters "HAP" nearly unreadable, and the package will probably interpret them as one character. At normal contrast, the serifs of boldfaced characters tend to run together and the doubled thickness

of the lines and curves of the characters results in the filling in of holes (such as with the "A").

HAP

Degraded (photocopied) text

(8-point Times Roman)

Degraded documents—most commonly photocopies—can pose two problems. First, as the document gets lighter, excessive numbers of fractures appear. This wouldn't be so bad if it weren't for problem number two, which is that photocopy output doesn't degrade evenly; you get combinations of light and dark bands on the page. This precludes simply changing the contrast to remedy the fracture problem.

the

country,

Italics

(10-point Zapf Chancery Italic)

Italics and highly stylized characters pose several difficulties. For instance, they touch in many places, like script, making them difficult to separate. In addition, while most of the features are the same as the roman versions—a "c" will always be a three-quarter circle, for example—some of the features will be exaggerated in such a way as to cause omnifont packages considerable confusion.

Kerning

(10-point Helvetica)

Tightly kerned characters are mostly a problem for pattern-matching products. Omnifont technology uses a method called streaming—following the trail of whitespace from above a line to below it—to create a nonlinear border between characters. Pattern matchers, on the other hand, can create only linear divisions, so this "at" would be perceived as one character.

at

Monospaced characters

(10-point Courier)

Compared to the proportional fonts on this page, monospaced fonts have oceans of whitespace surrounding each character, so that characters that would normally be touching—in this case the "r" and the "a"—are far enough apart to get an accurate reading with most packages.

Trav

From "Gulliver's Travels" by Jonathan

(CHAPTER VI

Of the inhabitants of Lilliput, their learning, laws and customs; that country. His vindication of a great lady.

their sight towards objects that with observing a cook pulling a common fly; and a young girl thr

They bury their dead with their heads directly in eleven thousand moons, they are all (which they conceive to be flat) will shall, at their resurrection, be found ready standing on their feet. practice still continues, in compliance to the vulgar.

liar, being neither from the left to the right, like the Bur from up to down like the Chinese; nor from down to up, the other, like ladies in England.

There are some laws and customs in this empire very pe country, I should be tempted to say a little in their justification. mention relates to informers. All crimes against the state are pun

They look upon fraud as a greater crime th for they allege, that care and vigilance, with a very c from thieves, but honesty hath no fence against sup be a perpetual intercourse of buying and selling, ar connived at, or hath no law to punish it, the advantage. I remember when I was once into his master of a great sum of money, which he ha to tell his Majesty, by way of extenuation, that it monstrous in me to offer, as a defense, the greate say in return, farther than the common answer t confess, I was heartily ashamed.

Although we usually call reward and pun turns, yet I could never observe this maxim to be

Ligatures

(10-point Times Roman)

This "ff" is an example of one of the more-common ligatures (touching characters). With trainable packages you train each ligature as a separate character; omnifont packages count the characteristics of ligatures as features separate from the characters that compose them.

ffe

.m

Underlining

(8-point Helvetica)

Regardless of the font type, underlining is very difficult to separate from the characters. One method for parsing underlines is to check the amount of horizontal whitespace, but even that method becomes a problem when dealing with descenders such as "g" and the "i". In small point sizes even characters that do not have descenders tend to merge with the underline, most notably characters with bowls like "a" and "b".

ing.

COO

Dot Matrix

(Draft IBM Proprinter)

Think of 9-pin dot matrix text as a page full of fractures. Looking at the "o" you can clearly see the gaping holes between the left three-quarters of the character and the right side—this would probably become a "ci".

Joins

(8-point Times Roman)

right

Characters with serifs usually develop the most joins; here, the serif of the "h" is touching the "g". The "ri" also provides an example of a ligature that will probably result in an "n".

1

Noise

The package will usually attempt to read stray marks or dirt on the paper, such as this random blip. If you have excessively noisy documents, you might want to clean up the TIFF files with a paint package or gray-scale editor before performing recognition.

Fractures

(10-point Times Roman)

If you look closely at the first arc on this "m," you might be able to see the small break in the character. This seemingly in-

nocuous imperfection can cause a split—the character would probably be translated as "in" or some similar variation.

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Graphic created by Bill Tinker using the TARGA board with TIPS®, LUMENA™ and RIO™. For more information contact Cheryl Stockton at (212) 925-8481.

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CIRCLE 28 ON READER SERVICE CARD



ACCURACY PERFORMANCE TESTS: OPTICAL CHARACTER RECOGNITION SOFTWARE

OCR software displays extraordinary variability in accuracy, not only among all packages but within individual packages as well. As a rule, the trainable packages were much weaker than the omnifont packages, but all proved to be weak on proportional 8-point fonts.

The **HP LaserJet Suite** tests the software's recognition accuracy on single-column pages of 12-point Courier and Line Printer fonts in portrait and landscape orientations.

The **Dot Matrix Suite** tests the software's recognition accuracy on single-column pages in both portrait and landscape orientations of 24-pin draft output from an Epson LQ-1000 and of 9-pin draft output from an IBM Proprinter. Here we report the results for portrait orientation only.

The **Courier Two-Column Suite** tests the software's recognition accuracy on two-column pages of 10-point Courier 600-dot-per-inch output. The test pages include ragged and justified columns, as well as pages with a graphic embedded in the upper-left-hand corner or the center of the page.

The **Mixed Text Suite** tests the software's recognition accuracy on a single-column page of 10-point, 600-dpi Courier output. The page contains both italicized and underlined text.

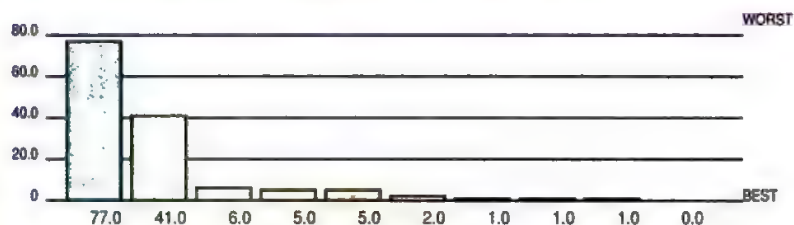
The **Mixed Type Size Suite** tests the software's recognition accuracy on single-column pages of 8-, 10-, 12-, 14-, and 18-point 600-dpi output in Courier, Times Roman, and Helvetica. Here we report the results for Times Roman and Helvetica only.

N/A—Not applicable: the package does not support this feature.

HP LASER SUITE

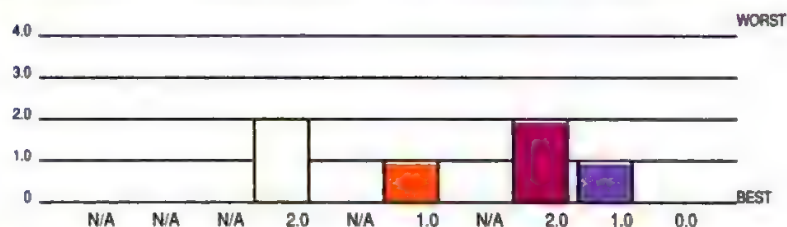
Portrait Courier (12-point)

(Errors per page)



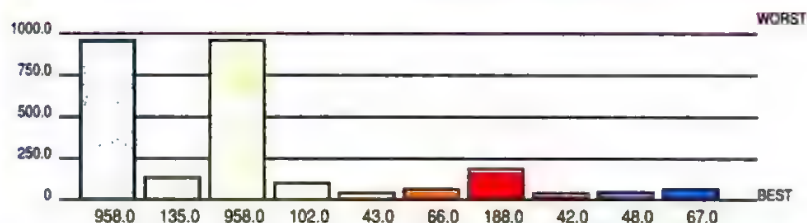
Landscape Courier (12-point)

(Errors per page)



Line Printer

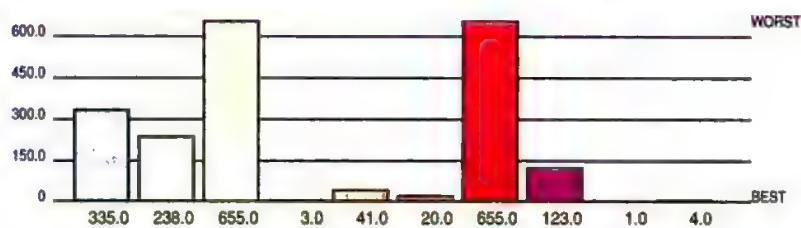
(Errors per page)



DOT MATRIX SUITE

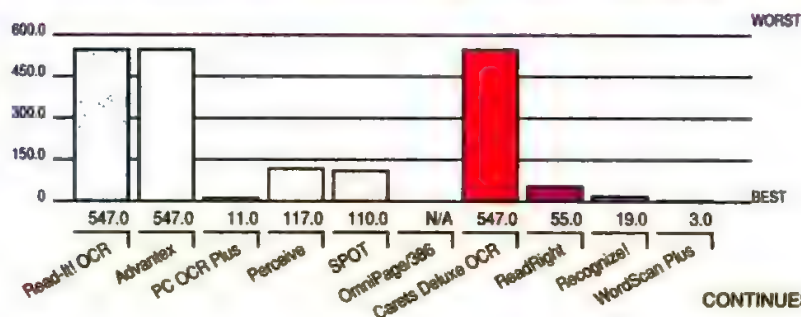
24-pin Epson LQ-1000 draft (portrait)

(Errors per page)



9-pin IBM Proprinter draft (portrait)

(Errors per page)



CONTINUES

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And We'll Prove It.

ognition we build into our hig
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e cha
o the
narie
ther OCR products. You can eve
o it accurately recognizes un

pop-up

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We started with the lowest error-rate OCR technology in the industry. Then we added exclusive features to make WordScan even more accurate. With WordScan you get the same state-of-the-art recognition we build into our high-end systems, at desktop prices.

Exclusive features make WordScan even more accurate.

Our unique *Pop-up Editor* guarantees the most accurate results possible. It pops up an enlarged image of any

COMPARE FEATURES	WORDSCAN PLUS	OMNIPAGE
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CONTEXT-BASED OCR	YES	NO
IMAGE POP-UPS FOR FASTER PROOFING	YES	NO
BUILT-IN DOT-MATRIX SUPPORT	YES	NO
STYLE SHEETS	YES	NO
SCAN NOW, RECOGNIZE LATER	YES	NO
MULTI-JOB PROCESSING	YES	NO
SUPPORTS 286 PCs	YES	NO
SUPPORTS MICROSOFT WINDOWS 3.0*	YES	NO
MINIMUM MEMORY REQUIREMENTS	2Mb	4Mb

*Standard and enhanced mode

questionable character or word so you can proof without referring to the original document.

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CALERA

RECOGNITION SYSTEMS
CIRCLE 522 ON READER SERVICE CARD



ACCURACY PERFORMANCE TESTS: OPTICAL CHARACTER RECOGNITION SOFTWARE

COUNTING ERRORS: WORDS VS. CHARACTERS

Errors were counted as word errors, or the number of words that contained one or more incorrect characters; a punctuation mark is counted as part of the word preceding it. While character errors, which the software companies use in determining their claimed accuracy, convey the number of keystrokes necessary to correct a file, word errors reflect the number of searches (with your spell-checker) you will have to perform. We feel the latter is more time consuming than fixing the actual keystrokes. This also allows us to make the distinction between the effort necessary to correct a word with three wrong characters (three keystrokes) and three words with one wrong character each (three searches plus three keystrokes).

We tested the packages using a Hewlett-Packard ScanJet Plus attached to a Compaq Deskpro 386/25 equipped with 4MB RAM and a 60MB hard disk.

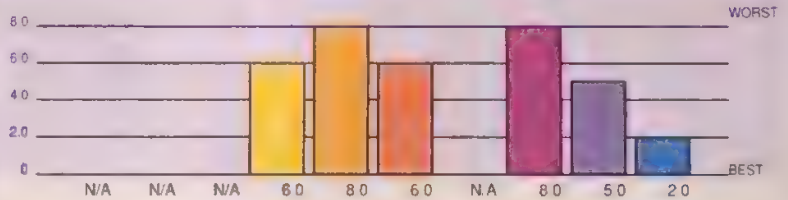
N/A—Not applicable: the package does not support this feature

COURIER TWO-
COLUMN SUITE

MIXED TEXT
SUITE

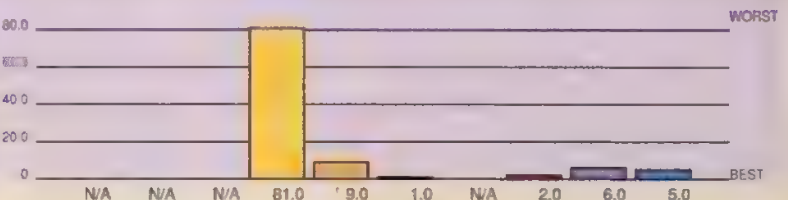
Courier (ragged right, 10-point)

(Errors per page)



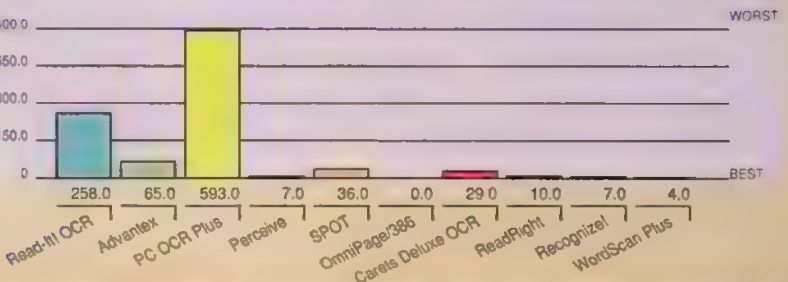
Courier (justified, 10-point)

(Errors per page)



Courier (10 point italic and underline)

(Errors per page)



Perceive

by Mitt Jones

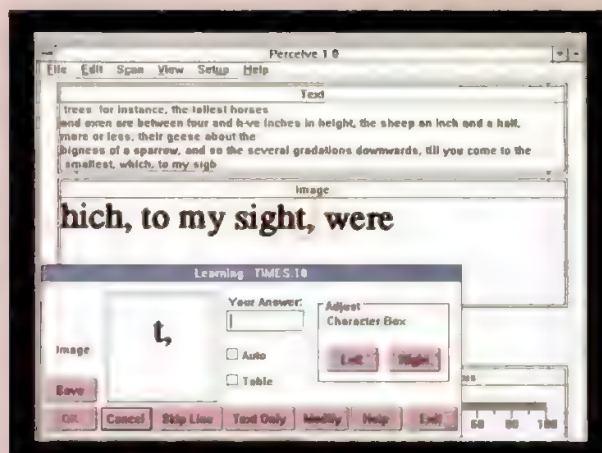
Can't decide whether to buy an omnifont package or a trainer? Not only will *Perceive's* able omnifont algorithms handle most of your recognition work, you can train it for fonts with which it has trouble. This \$795 package might also suit your fancy if you're among the 286-based holdouts in the crowd. Unlike some of its competitors, *Perceive* stops short of demanding a 386 machine, although you'll need at least 2.6MB of RAM and a few megabytes of free hard disk space, whatever processor your computer has.

Perceive comes with versions that run under Windows 3.0 (which we tested) and under Windows 2.1. Aside from a few aesthetic differences, the interfaces of the two versions are identical. The Windows

3.0 version benefits in speed from the improved memory handling of Windows 3.0, but fails to take advantage of the new environment's improved icon-handling tools and help facilities.

LEARNING MODE

Perceive's strongest asset is the flexibility it offers in its recognition methods. With standard sizes of standard typefaces, the product's omnifont recognition mode will



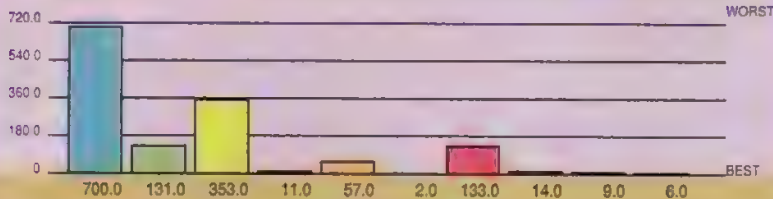
Perceive is an omnifont package, but you can improve its accuracy on unusual fonts through training.

GRAPHICS OCR SOFTWARE

MIXED TYPE SIZE SUITE

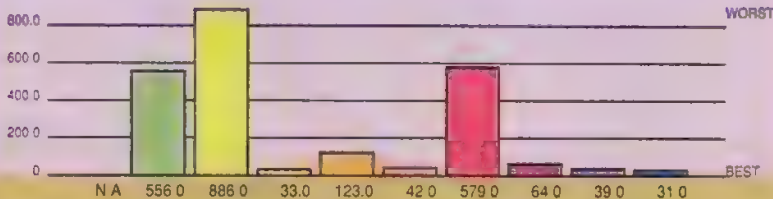
Times Roman (12-point)

(Errors per page)



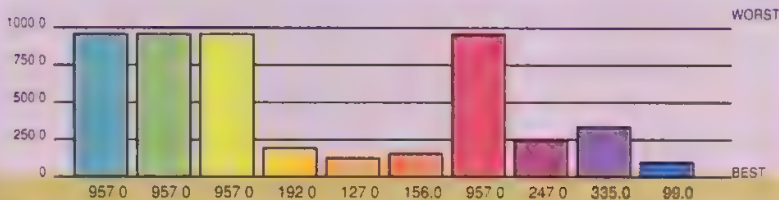
Times Roman (10-point)

(Errors per page)



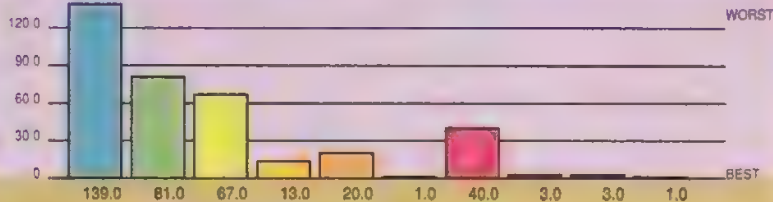
Times Roman (8-point)

(Errors per page)



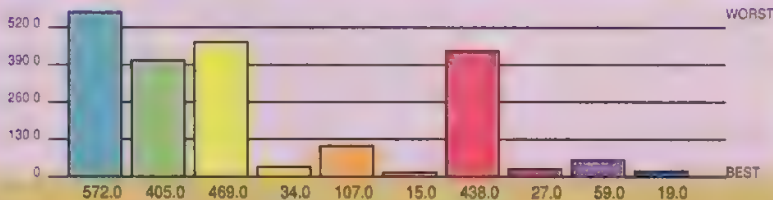
Helvetica (12-point)

(Errors per page)



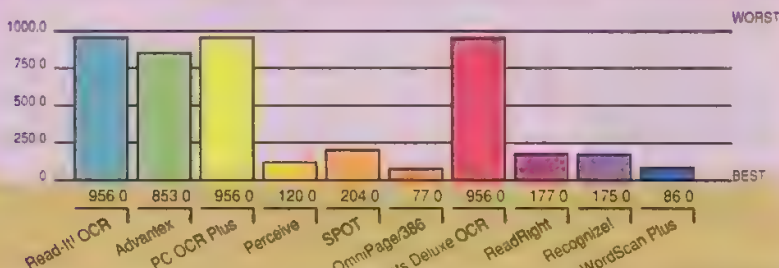
Helvetica (10-point)

(Errors per page)



Helvetica (8-point)

(Errors per page)



CONTINUES

give you good results. For those occasions when your documents aren't quite so standard, *Perceive* offers a learning mode, which you can use either alone or in conjunction with the omnifont mode. If you're scanning 100 pages of 11-point Galliard text, for example, this feature lets you

Suitability to Task

Monospaced Text	☐	☐	☒	☐
Proportional Text	☐	☐	☒	☐
Complex Documents	☐	☒	☐	☐

spend a few minutes training any characters that cause problems before you get under way. Assuming the characters aren't too closely spaced for proper recognition training, you'll get better results by performing the scan with both the omnifont and pattern-matching modes invoked than you would get from omnifont recognition alone.

Perceive lets you scan and recognize in one step, or scan in the image only for later recognition. The program comes with both text and graphics editors, though the graphics editor is capable of little more than cutting and pasting.

Throughout our testing, *Perceive* did what it promised. It performed very well on all the Courier test samples, and also with the medium and large sizes of our Times Roman and Helvetica samples. One of its few limitations crops up when scanning 9-pin dot-matrix text; Ocron has not included the ability to read draft-quality dot-matrix type without training. *Perceive*



FACT FILE

Perceive

Ocron Inc., 3350
Scott Blvd., Bldg. 36,
Santa Clara, CA
95054; (408) 980-
8900.

List Price: \$795.

Requires: IBM AT or compatible, 4MB RAM,
hard disk, mouse, DOS 3.3 or later, Microsoft
Windows 2.1 or 3.0.

In Short: One of few packages offering both
omnifont and training capabilities, *Perceive*
recognizes most text quickly and accurately.
But it lacks automatic page decomposition and
true-page formatting, and it doesn't retain
character enhancements, which are real
deficiencies considering its price.

CIRCLE 414 ON READER SERVICE CARD

MAX
LTR A4

When we sat down to all the lights of

Accurate color scanning seems a simple enough goal. Yet in a flash of engineering brilliance, Epson® designers have raised the standard by creating the ES-300C color scanner.

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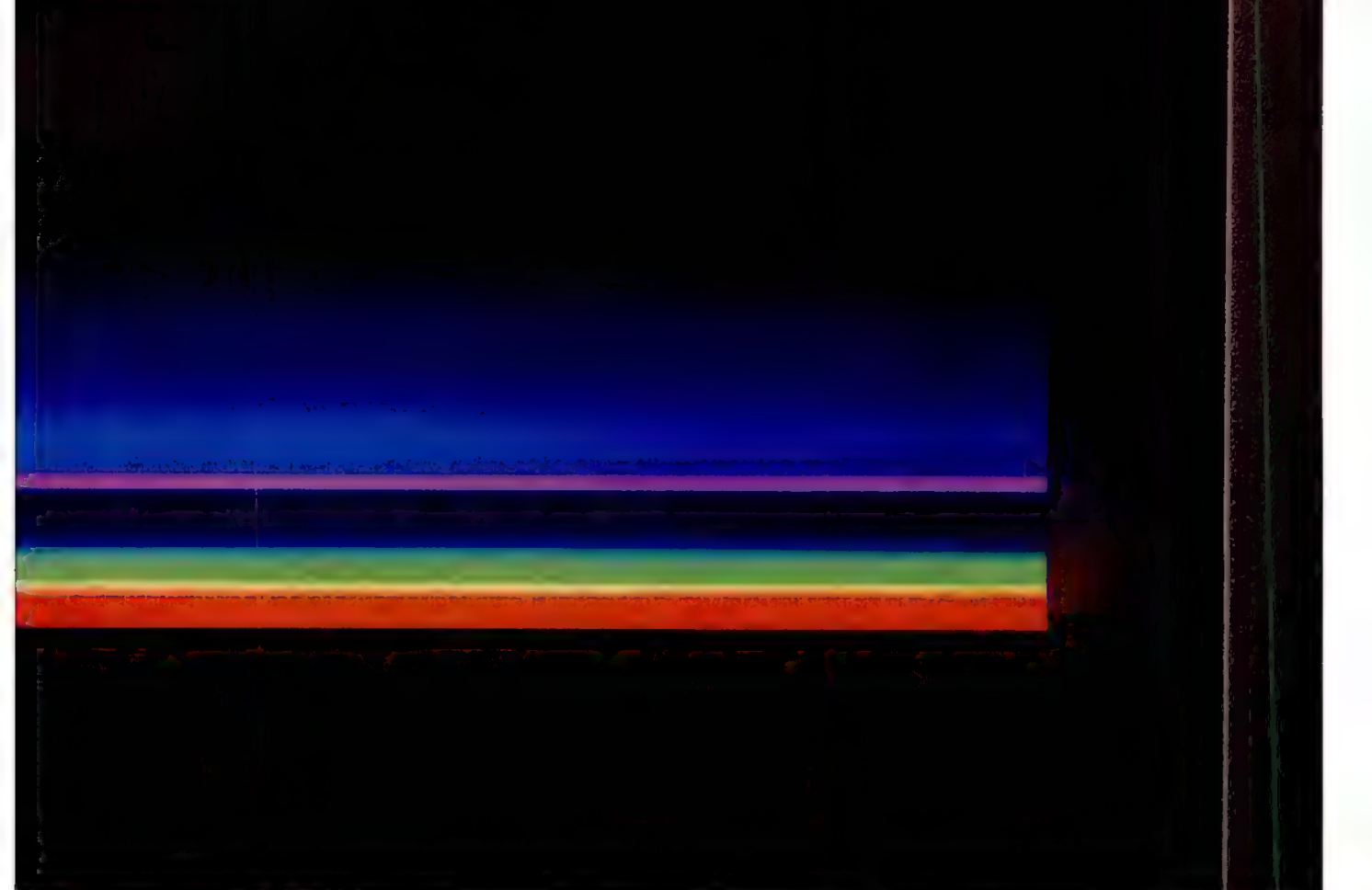
color scanners require three passes to accomplish.

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design a better scanner, came on at once.

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A demonstration of the Epson ES-300C will be an illuminating experience. Other scanners simply pale by comparison.

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ACCURACY PERFORMANCE TESTS: COMPOSITE VIEW

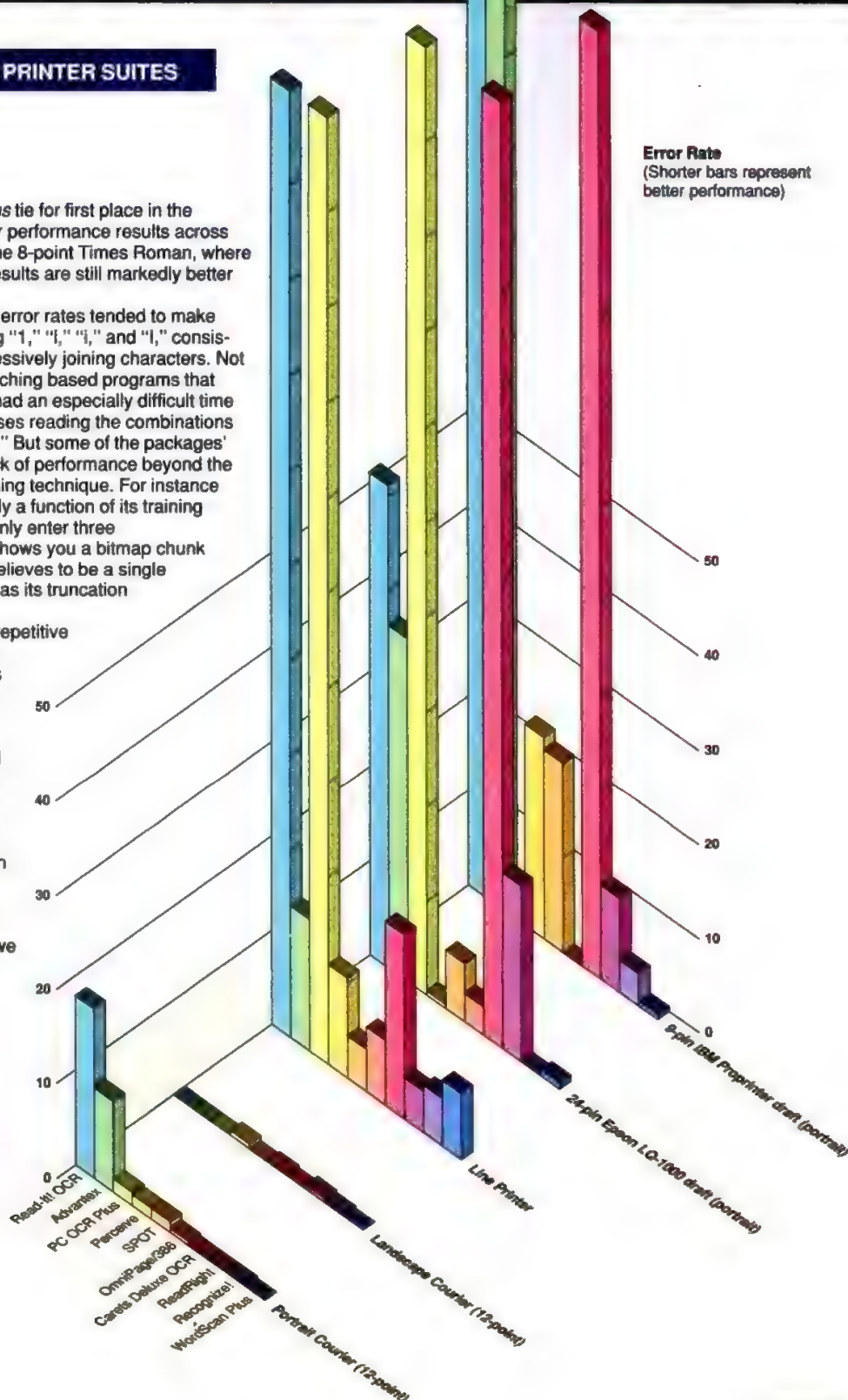
LOW-RES PRINTER SUITES

OmniPage/386 and *WordScan Plus* tie for first place in the accuracy contest, turning in similar performance results across the board—with the exception of the 8-point Times Roman, where the not-so-good *WordScan Plus* results are still markedly better than those of *OmniPage/386*.

The packages with the highest error rates tended to make repetitive errors, such as confusing "l," "i," "j," and "1," consistently dropping characters, or excessively joining characters. Not surprisingly, it was the pattern-matching based programs that faced these difficulties; *Advantex* had an especially difficult time with joined characters, in many cases reading the combinations "mm," "im," and "em" as plain "m." But some of the packages' poor designs exacerbated their lack of performance beyond the inherent flaws in the pattern-matching technique. For instance *Read-It!*'s poor showing is probably a function of its training interface; when training, you can only enter three characters—even if the package shows you a bitmap chunk of four or more characters that it believes to be a single character. Carets' main problem was its truncation of lines.

The omnifont packages made repetitive errors as well, although they were usually restricted to the small fonts and differed across packages. In the 8-point Times Roman, for instance, *WordScan Plus* turned "e"s to "c"s, read "rn" as "m," and changed some "th"s to "d"s, while *OmniPage/386* substituted "Y" for "ar" and "k" for "le."

While reading these numbers, keep in mind that any package with an error rate above 10 percent—one out of every ten words—can be excessively time-consuming to clean-up after, and we recommend this as a cutoff point when considering the packages.



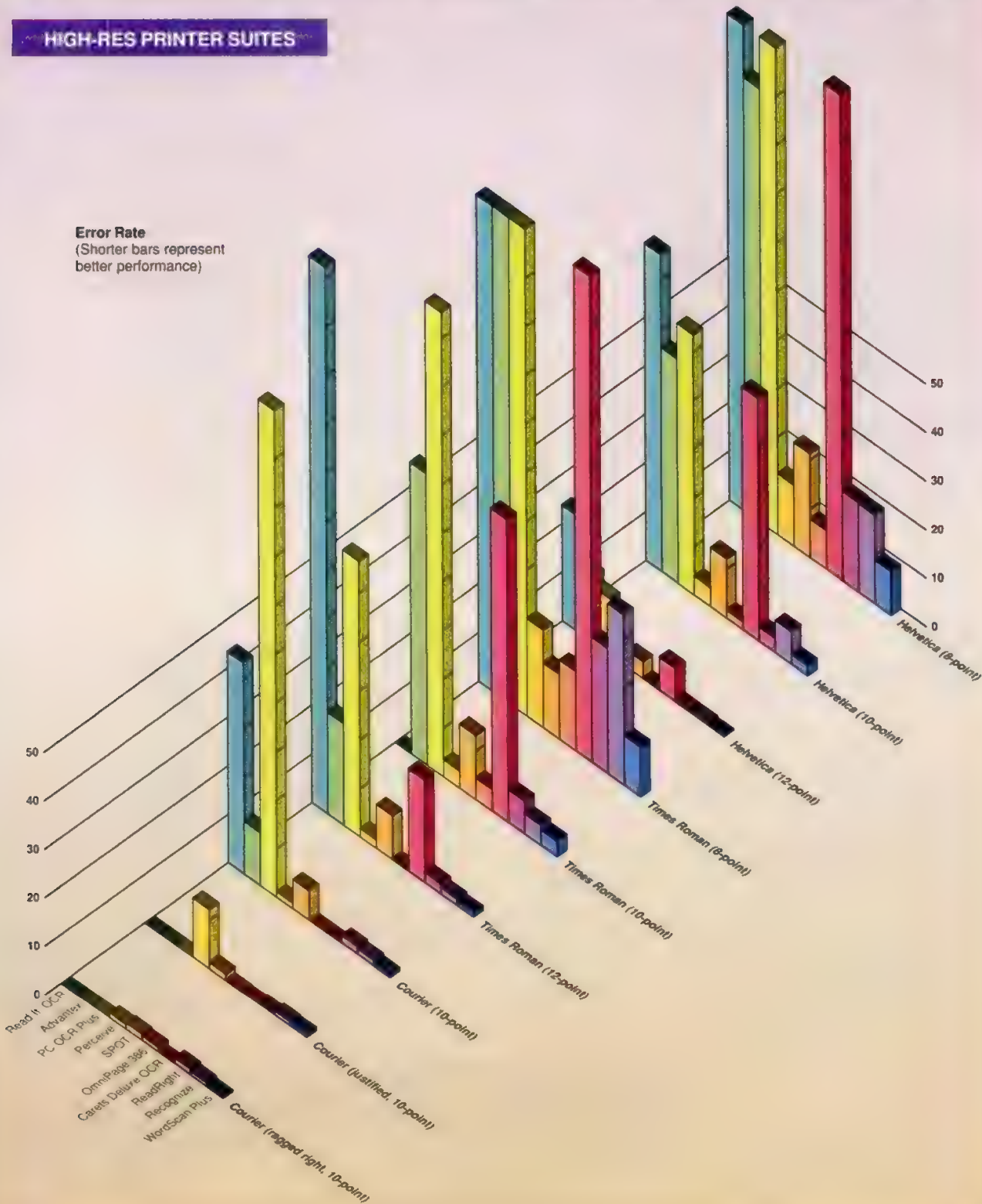
CONTINUES



ACCURACY PERFORMANCE TESTS:
 COMPOSITE VIEW

HIGH-RES PRINTER SUITES

Error Rate
 (Shorter bars represent better performance)



ENDS

also seems more sensitive to the contrast level of the printed page than we would have liked. We had to change the *Perceive* contrast settings frequently to keep accuracy at its highest.

THE BEST IS YET TO COME

When compared with its best competition, *Perceive* falls a bit short of the mark in features—most notably in its lack of automatic page decomposition. *Perceive* can handle multicolumn pages or text with embedded graphics if you set the Text Region option to “partial page.” In this

Perceive falls short of the mark in its lack of automatic page decomposition.

case, however, *Perceive* gives you a preview of the page, and you must identify each scan region in order. To render side-by-side columns into one long column, for instance, you select each column separately. You’d eliminate graphics by selecting only the surrounding regions. By default, *Perceive* scans the sections in the order of their marking, but you can change the sequence before recognition if you want.

More important, although this first version of the program supports *WordPerfect* and *WordStar* output file formats, it cannot carry over character traits such as underlining, or format the finished document in any way other than inserting spaces and carriage returns. In addition, its user interface could stand a few improvements. *Perceive* is fairly easy to use, but it does present you with some ambiguous menus and a particularly confusing dialog box or two, most notably the one that controls the learning mode. Given *Perceive*’s austere and spotty on-line help, you’ll have to resort to the manual for assistance.

Though *Perceive* is fast and accurate, its high-end feel makes its shortage of features seem all the more obvious. Automatic page decomposition, page formatting, and retention of character enhancements should be standard in a product in this price range. Ocron reports that a new version that will add these features will be

GRAPHICS OCR SOFTWARE

more robust about contrast variations as well. But for the time being, you’ll find more value elsewhere.

Read-It! OCR

by Bill O'Brien

Read-It! OCR from Olduvai Corp. may look to be a cut above the other trainable packages in this review, with its fancy *Microsoft Windows* interface and its various training options. But looks don’t always count for much when it comes to OCR—especially when those looks are backed by such poor performance.

Let’s look at installation. *Read-It! OCR* does not come with a runtime copy of *Windows 2.1*, so you must send a coupon to Olduvai if you don’t have *Windows 2.1* already. And since the installation program is only a batch file, you cannot specify your particular scanner. The driver for our testbed HP ScanJet, for instance, is left unmentioned in the documentation even though it is available on the distribution disks, and must be copied to your *Windows* directory in order to be installed. Overall this product is distinctly below the standards we have come to expect for commercial software.

Using *Read-It! OCR* is a two-step process. You first scan in the page you want and *Read-It! OCR* will accept it as a graphic image that will be saved in TIFF format. Next, the recognition process creates an ASCII file (the software supports no other text format, so character enhancements are naturally not saved). This design has the benefit of enabling

Suitability to Task

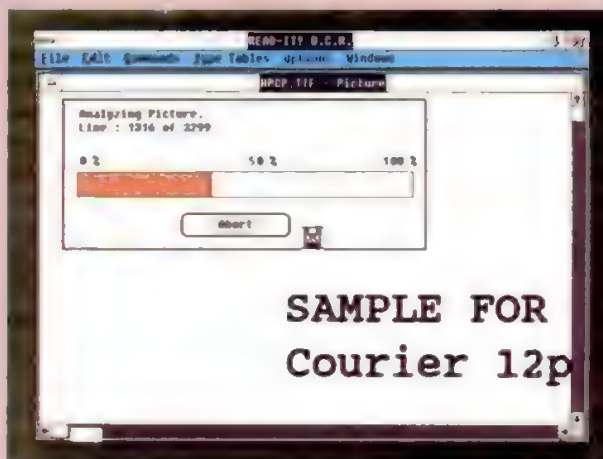
Monospaced Text	☐	☐	☐	☐
Proportional Text	☐	☐	☐	☐
Complex Documents	☐	☐	☐	☐

Read-It! OCR to work with any TIFF file captured by your scanner’s own operating software—whether or not the scanner is directly supported. But this process is more trouble than the one-step procedures supported by other packages.

LACK OF RECOGNITION

Read-It! OCR uses type tables to recognize scanned characters. It comes with type tables for several 12-point Apple LaserWriter fonts, HP LaserJet Courier typefaces, and both 10- and 12-point dot-matrix tables. Unfortunately *Read-It! OCR* performed inadequately, failing every one of our essential tests. Its high error rate stems from trouble with ligatures and character spacing variations; although the product has options that help it adjust to image problems, much of your document may not be recognized correctly even if it consists of fonts it knows. It’s also incapable of handling underlined passages or landscape text.

Read-It! OCR does have a learning mode that lets you improve the recognition of its pretrained fonts and train fonts that aren’t included in the package. The Learn selection displays a dialog box where *Read-It! OCR* shows you the problem-prone characters from the scanned image, plus descriptive messages about



In spite of its *Windows*-based interface, *Read-It! OCR* fares poorly on the practical measures of OCR performance, accuracy, and speed.

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CIRCLE 312 ON READER SERVICE CARD



FACT FILE

Read-It! OCR
 Olduvai Corp., 7520
 Red Road, Suite A,
 South Miami, FL
 33143; (305) 665-
 4665.
List Price: \$495.
Requires: IBM AT or compatible, 1MB RAM,
 hard disk, mouse, DOS 3.0 or later, *Microsoft*
Windows 2.1.
In Short: This trainable package comes with
 several pretrained fonts and is capable of a
 limited degree of self-training, but its uniformly
 poor performance rules it out as a practical
 solution. Not recommended.

CIRCLE 415 ON READER SERVICE CARD

GRAPHICS

OCR SOFTWARE

ReadRight

by Mitt Jones

In our March 28, 1989, scanner roundup ("From Fax to Finish: Scanners Build a Better Image") Canon USA's Image Scanner IX-12F walked away with an Editor's Choice largely for its no-hassle text recognition capabilities. At least some of the credit belongs to *ReadRight*, which Canon supplied as an option with our evaluation unit.

The latest version of *ReadRight* offers even more features, improved accuracy, and expanded scanner support. This \$495 omnifont package handles the most common monospaced and proportional fonts with mercifully few errors. It can read multiple columns, multifont text, and landscape text. Better yet, it is thrifty with machine resources; it runs acceptably well on a 286 machine with 640K of RAM, although this is a tight fit; the program needs about 575K of free conventional RAM, or about 535K if you have some expanded or extended memory.

BACK TO BASICS

ReadRight can do most common jobs with virtually no operator intervention. Much of the time, you need only press the Enter key to begin scanning. After prompting you for the output filename, *ReadRight* will scan the page, recognize the text, and save the file.

The main screen lists the current value of each of ten basic scan options, along with the proper function key to push should you need to change any of those values.

ReadRight can write files in a large number of popular word processor formats; if you need to change the output format you simply press F6 and choose the appropriate format from a pop-up list. Similarly, the F5 key invokes *ReadRight*'s separate dot-matrix algorithm, and the F9 key specifies page orientation and whether the scan document has multiple pages.

GOOD TEST RESULTS

ReadRight performed admirably on monospaced text, recognizing all sizes of Courier text from eight points to 18 with few flaws. It didn't do as well on dot-matrix text, even with the algorithms activated,

Suitability to Task

Monospaced Text	☐	☐	☐	3	☐
Proportional Text	☐	☐	☐	3	☐
Complex Documents	☐	☐	☐	2	☐

although it did perform better with our IBM Proprinter print samples than with the Epson LQ samples. Proportional typefaces yielded mixed results, however. Though its performance on the Helvetica samples of ten points and up was excellent, its Times Roman output was marginal at ten points and only acceptable at 12 points.

The package recognizes boldfaced, underlined, and italicized text, though the error rate with such enhancements was understandably a bit higher than without. It inserted bold and underline text enhancement codes into *WordPerfect 5.0*

the specific problem it has encountered. Any corrections you type then become part of the type table.

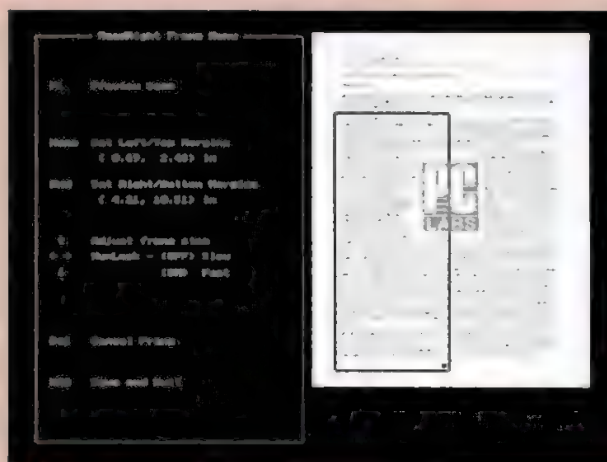
Under normal circumstances, training *Read-It! OCR* to recognize new fonts is a tedious and time-consuming process. On one pass with a LaserJet page, for instance, it took *Read-It! OCR* approximately 20 minutes to parse the document in learning mode. This intense procedure does seem to improve things; the error rate for subsequent scans using the same font was somewhat lower. But in spite of our efforts, still the product failed to attain satisfactory accuracy.

Read-It! OCR also offers an EasyLearn feature that lets you create a type table without keyboard input. To use it, you need the TIFF file of the scanned document, in addition to an ASCII file that contains the exact, full, corrected text of the document. The program can then match the two documents character for character to create the type table for the fonts.

POOR CHOICE

The program is fairly good at handling multiple columns. It does not decompose a multicolumn page automatically, but you can define sequential recognition areas on the scanned document. The *Windows* environment makes this easy: You can easily select the areas using the mouse. You can also create useful templates to specify the recognition sequence of multiple documents with the same columnar format.

Although its windowing interface and relatively advanced features indicate that it should work fairly well for a trainable package, *Read-It! OCR*'s test results belie its promise. Competitors such as *ReadRight* work far better for the same price.



ReadRight does a good job with multicolumn text, but it has no way of blocking out graphics; in this example, you'd have to cover the *PC Magazine* logo with a piece of blank paper.

PC FACT FILE

ReadRight, Version 2.01
 OCR Systems Inc.,
 1800 Byberry Rd.,
 #1405, Huntingdon
 Valley, PA 19006, (800) 233-4627, (215) 938-7460
List Price: \$495.
Requires: IBM XT, AT, or compatible, 640K RAM, hard disk, DOS 3.0 or later.
In Short: This omnifont package is one of the easiest to use, and it's quite accurate despite its relatively low price. If you don't need to handle complex documents, it can be an excellent choice.

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its fancier competitors, it does not demand a high-end machine. Its only major deficiency is in scanning complex pages; however, OCR Systems should be offering ReadRight for Windows, which should provide full page-decomposition capability, by the time you read this. If this package does everything OCR Systems says it will do, the \$100 upgrade fee will be a good investment.

Recognize!

by David Dean

DEST has been a major name in the PC-based OCR market since the introduction of its first OCR workstation in 1982. Until recently DEST customers had to rely on the proprietary OCR scanners the company manufactures. But the latest release of *Recognize!* (\$695) works with industry-standard page scanners from Hewlett-Packard and Microtek as well as with DEST's own hardware. With its improved speed and multicolumn formatting and landscape recognition, it proved a capable contender.

Recognize! will run with as little as 512K of RAM (420K if you have expanded memory available), and works on an 80286-based computer. Its interface is simple and consists of one setup screen and four OCR processing screens that require adjustment of only a few readily understandable settings. It is an omnifont program with no provision for training, but you won't miss it since it proved quite accurate on most of our test pages, including dot-matrix output (oddly, it failed on

the 10-point Helvetica series). The program's scan brightness controls, which offer seven different settings, allowed us to get reasonable results for degraded copy.

Unfortunately, *Recognize!* can read only lower-order ASCII characters; it records few symbols accurately and no foreign language characters. While it does preserve underlining, it cannot retain boldface in every case. Although it often dropped phrases of monospaced bold text from the scanned page as if they never existed, it did retain the boldface attributes on the proportionally spaced Helvetica and Times Roman samples.

FOUR-PART PROCESS

Recognize! can either scan your text directly or work from a TIFF file. Its character-processing screen shows the dark-

Suitability to Task				
Monospaced Text	☐	☐	☒	☐
Proportional Text	☐	☐	☒	☐
Complex Documents	☐	☐	☒	☐

output files without error. It also flawlessly carried over text columns into *WordPerfect* files. Switching to and from an italic font were the only text changes *ReadRight* seemed unable to carry over.

ReadRight has a few limitations when it comes to more-complex documents. While the program does an admirable job of handling neatly-aligned columns, it lacks any sufficient means of handling graphics or uneven columns, or a combination of both. The program does include a page preview and a framing utility that lets you mark one rectangular area of the page. But the frame demarcates the area to be scanned, not the area to be omitted. To omit an embedded graphic, you must cover it with a blank piece of paper (the manual recommends a Post-It note), or else scan each section of text in a separate pass.

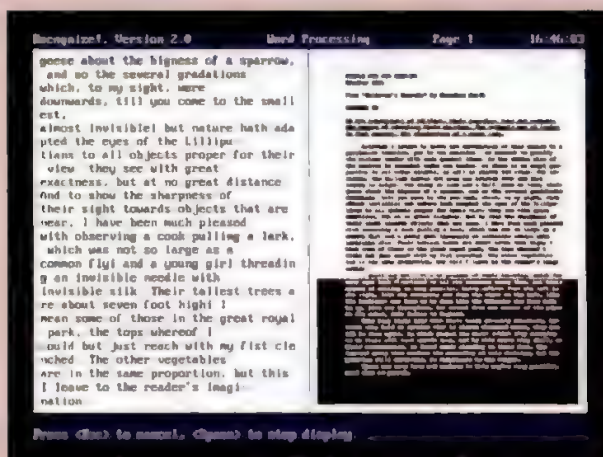
A FEW LIMITS

ReadRight 2.01 also omits any internal facility for editing or browsing recognized text. The screen scrolls recognized text up the screen as the scan job proceeds, but you won't see it again until you pull the file into your word processor. To help offset this inconvenience, OCR Systems built an option into its Utilities menu that lets you jump straight to your word processor and back again, undoubtedly a useful feature for those who scan documents directly into word processor formats. Even so, a way to examine recognized text without leaving the program would be desirable.

Despite these few shortcomings, *ReadRight* 2.01 remains an excellent choice for straightforward OCR applications. It's one of the most accurate and easy-to-use of the lower-priced packages, recognition speed is satisfactory and, unlike some of

ness, clarity, and alignment of sample characters from the scanned page in a window. If any of these features appears too far off, you can interrupt the process and readjust the settings. If the page is in landscape orientation, it is rotated to portrait orientation before the recognition process begins.

Recognize! is capable of automatically decomposing complex pages, processing multicolumn layouts into single columns, or producing multicolumn output for word



DEST's *Recognize!* is accurate and fairly fast, but its user interface is spartan. You cannot preview the page or check the recognized text without stopping the recognition process.

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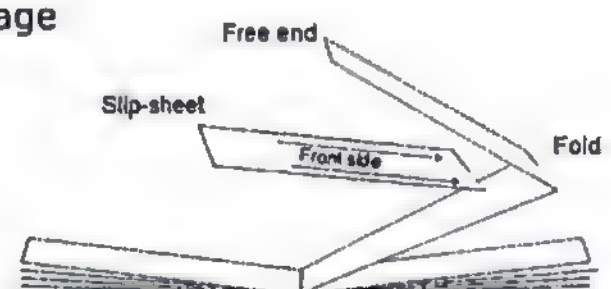
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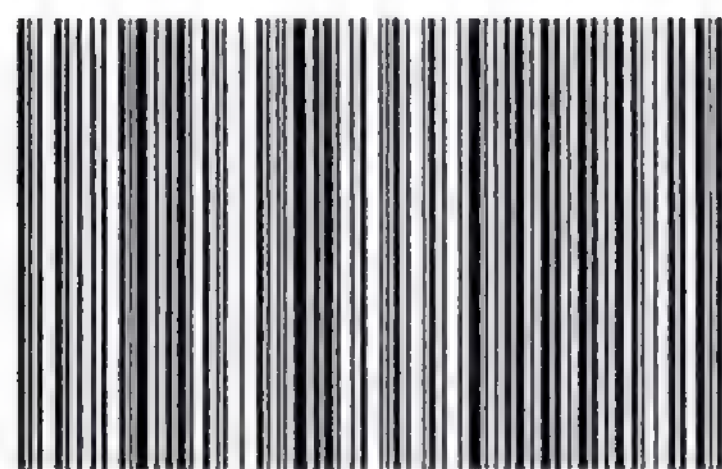
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3. Slice the folded edge
4. Close the page and slip-sheet



Foldout slip-sheet



GbsSlipSheet-001

Inverted Foldout slip-sheet

Folded edge of the page

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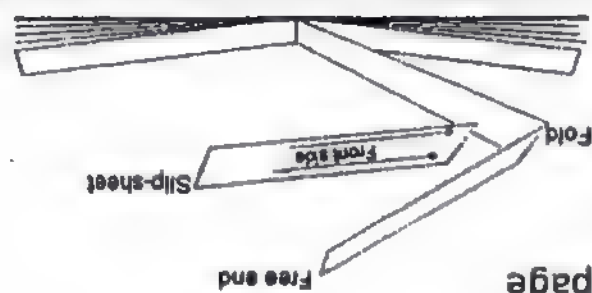
2. Insert this sheet with

1. Front side touching the free page

2. Arrow pointing to the fold

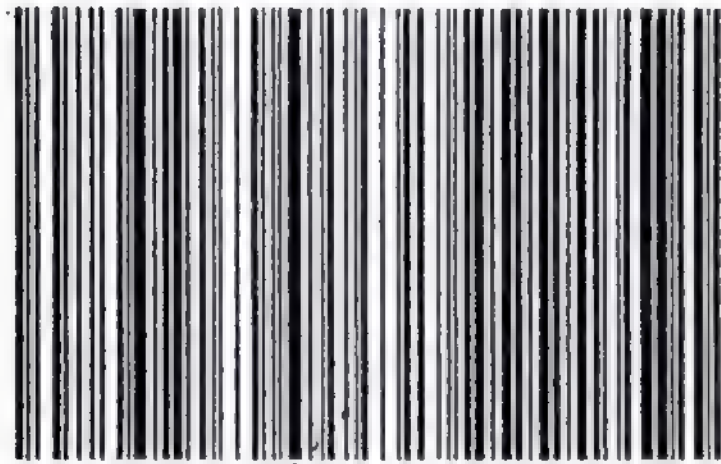
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4. Close the page and slip-sheet



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Back

1. Follow instructions on the other side

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Incredible is the word! How can we build your

10 Good Reasons To Buy From ZEOS®

Reason #1

"Overall Excellence."

As *PC Magazine* said "Price is always a consideration. So are benchmark test results. But both factors can be deceiving, which is why we consider them in the context of other aspects that will make the difference months and years down the road."

These are the attributes which *PC Magazine* used in awarding ZEOS the coveted Editor's Choice, not once but four times. And "Overall Excellence" are the very words *PC Magazine* used in describing ZEOS systems comparing them to all others.

Reason #2

Dazzling Performance.

In one recent '386 review, *PC Magazine* awarded ZEOS Editor's Choice. "The ZEOS '386 blows away every other computer... a smart choice" is what they said. And in another recent review, *Government Computer News* said the ZEOS 33MHz '386 is "arguably the fastest MS-DOS and OS/2 micro in the world."

Dazzling Performance is built into every ZEOS system. It's a key component of ZEOS Overall Excellence.

Reason #3

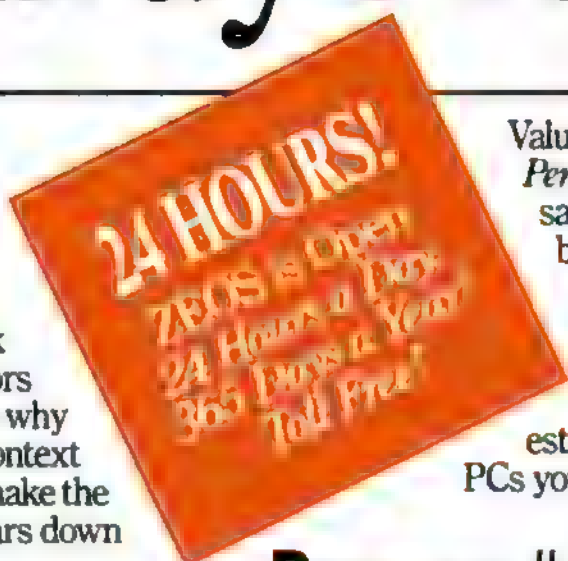
Exceptional Quality.

PC Resource Magazine put it this way, "ZEOS... provides quality comparable with IBM or Compaq and does so for about 70% of the price." ZEOS uses only the very best components. And every system is fully tested and burned-in right in our own labs.

Reason #4

Value.

InfoWorld says, "We find the ZEOS '386 an excellent value. Speed: Excellent. Compatibility: Excellent."



Value: Excellent."

Personal Computing said, "ZEOS... is the best value we've come across... its performance is right up there with the slickest, most expensive PCs you can buy."

Reason #5

Warranties and Guarantees.

ZEOS believes in its products. That's why we offer each and every customer our 30 Day Absolute Satisfaction Money Back Guarantee, no questions asked. Plus, our One Full Year Limited Warranty and Express Parts Replacement Policy. Optional On Site Service is available too. Call for details.

Reason #6

24 Hour Toll Free Technical and Sales Support.

At ZEOS, the customer is #1. That's why we invented 24 Hour a Day Tech Support. For *your* convenience. If you buy a product from us we feel we should be there to help, any time of the day or night. Give us a call Toll Free! 800-423-5891. Anytime!

Reason #7

Experience.

Almost unique in the mail order computer industry, ZEOS maintains its own chip level Research and Development staff. In addition to Systems Manufacturing, we also operate our own Board Level Manufacturing facility.

ZEOS has been involved in Research and Development since our incorporation back in 1981. Our strong and experienced Research, Manufacturing and Technical Staff translates into superior factory direct computer systems for you.

Reason #8

A Sterling Reputation.

In magazine after magazine and review after review ZEOS systems are cited for Overall Excellence, for Excellent Value, as the Right Choice and so on. All of this is flattering but the most important thing is this: What do our customers think? Frankly, they love us. The systems and the support. That means more to us than anything.

Reason #9

Easy to Buy.

ZEOS systems are easy to buy. You can pick up the phone any time of the day or night and order your new ZEOS computer. And we accept MasterCard, Visa, American Express, and Corporate Purchase Orders from Fortune 1000 Companies, Colleges, Universities and Governments. Complete Leasing Programs are available as well.

And now the Z-CARD! It's your very own ZEOS Credit Card and you can apply today. With the Z-CARD you can charge your ZEOS purchases and pay in easy monthly installments. It's just like a Bank Card. Why not apply for your Z-CARD now!

Reason #10

You're Going to be Very Satisfied.

When it comes right down to it, you're going to be very satisfied with your new ZEOS system. Our goal is your complete satisfaction. And that's our commitment to you. To quality. To performance. To reliability and support. To *Value*. We don't just say it, *we Guarantee it!*

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day, 365 Days
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SPEED PERFORMANCE TESTS: OPTICAL CHARACTER RECOGNITION SOFTWARE

The recognition speeds produced by the packages range from half a minute to almost 7 minutes per page. *OmniPage/386* swept past the pack in 10 out of the 14 tests.

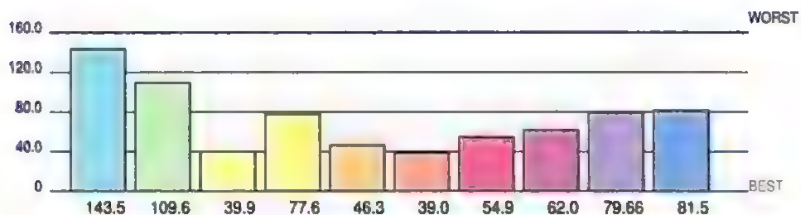
The **Recognition Speed** tests measure the amount of time it takes a package to perform OCR on a single page. Timing begins when the scanner is activated and ends when the user regains control of the computer.

Although *OmniPage/386* has an add-in for performing recognition on dot-matrix print, we did not include its IBM Proprinter output in the Accuracy tests. We did include its recognition time on the IBM Proprinter speed test in order to use it as the baseline-defining product. *WordScan Plus* was tested with the Pop-Up Verifier disabled.

HP LASER SUITE

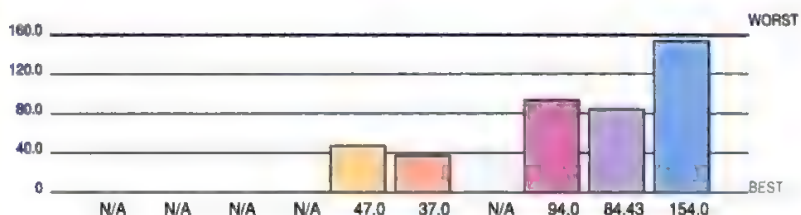
Portrait Courier (12-point)

Elapsed Time (seconds)



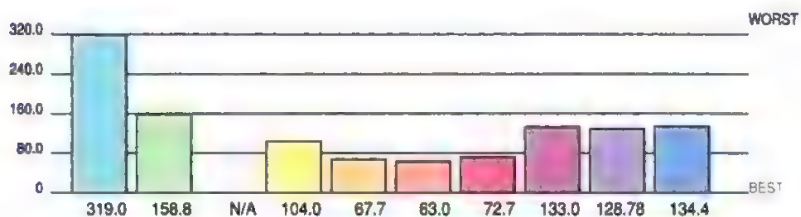
Landscape Courier (12-point)

Elapsed Time (seconds)



Line Printer

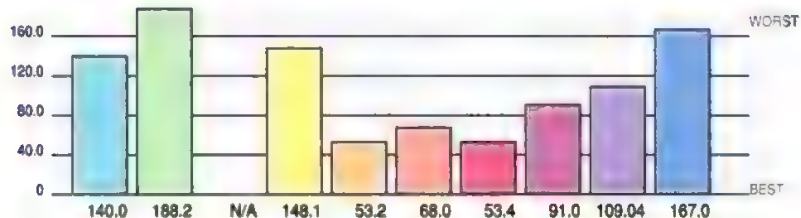
Elapsed Time (seconds)



DOT MATRIX SUITE

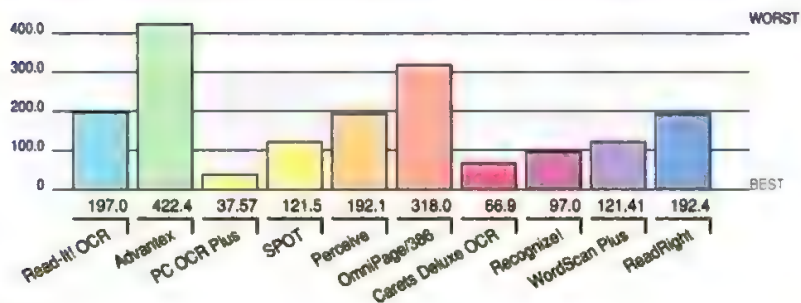
24-pin Epson LQ-1000 draft (portrait)

Elapsed Time (seconds)



9-pin IBM Proprinter draft (portrait)

Elapsed Time (seconds)



N/A—Not applicable: the package does not support this feature.

CONTINUES

processors that can handle such formatting. It has masking features that allow you to eliminate individual areas on the page, but it offers no templates, and no way to reorder the text regions it finds, or to save graphics separately.

Once the full page has been surveyed and displayed, *Recognize!* goes into word processing mode. The right window, containing the recognized text, switches to inverse video. A single column of sen-

Recognize! is compact enough to run on 80286-class machines, and its generally good accuracy makes it a reasonable choice for processing ordinary documents.

tences streams down the left window, and as the characters are deciphered you'll see the pound signs that represent unrecognized characters being replaced on the screen. You can view the page or the text at this point only by pressing the space bar to stop the operation. *Recognize!* does not offer a spell-checker or text editor.

TIME SAVER

Recognize! stores all its documents in what it calls the Universal WP Format—a

FACT FILE

Recognize!,
Version 2.0
DEST, 1015 East
Brokaw Rd., San
Jose, CA 95131;
(408) 436-2700.
List Price: \$695.

Requires: IBM AT or compatible, 640K RAM,
hard disk, DOS 3.0 or later.

In Short: *Recognize!* works very well on straight text recognition, including multiple columns and landscape text, but its barebones interface and its small, maximum text size are significant limitations.

CIRCLE 417 ON READER SERVICE CARD



GRAPHICS OCR SOFTWARE



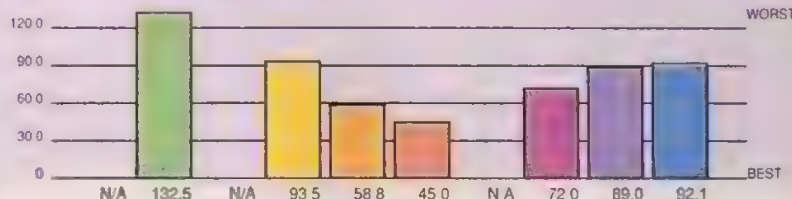
SPEED PERFORMANCE TESTS: OPTICAL CHARACTER RECOGNITION SOFTWARE

COURIER TWO-COLUMN SUITE

MIXED TEXT SUITE

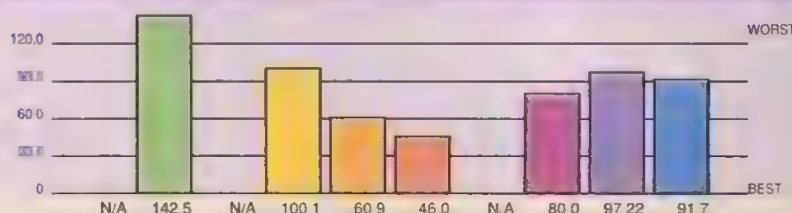
Courier (ragged right, 10-point)

Elapsed Time (seconds)



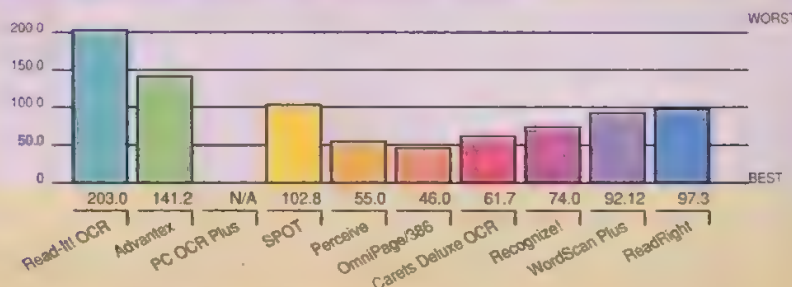
Courier (justified, 10-point)

Elapsed Time (seconds)



Courier (10-point)

Elapsed Time (seconds)



N/A—Not applicable: the package does not support this feature.

simple ASCII file with formatting information such as carriage returns, tabs, spaces, and between-word hyphens inserted. But it can translate this text to a wide array of word processor formats. *Recognize!*'s translator can be loaded from your AUTOEXEC.BAT file so that you don't need to choose a word processor format each time. After *Recognize!* is finished interpreting the document, it senses the translator's presence and performs the proper translation.

Recognize! has some advantages. It is compact enough for 286 machines, and its generally good accuracy makes it a reasonable choice for ordinary documents. But it could use some improvements, notably support for foreign characters, a better document preview mode, and support for a wider array of industry-standard scanners.

SPOT

by Alfred Poor

SPOT, from Flagstaff Engineering, appears to have it all: clever features, good looks, and a respectable list price of \$695. *SPOT*'s only problem is that good specs don't always guarantee good results.

SPOT is a trainable OCR package, and it comes with just seven font tables—a severe limitation. These font tables are restricted to a specific size of type—you cannot use a 12-point Times Roman OCR font table to recognize ten-point Times Roman type. Instead, you'll probably end up training the program for the new fonts you intend to use.

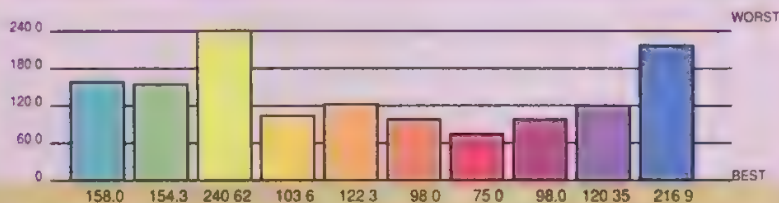
Fortunately, training is fairly easy. *SPOT* has a great deal of functional intel-

GRAPHICS

OCR SOFTWARE

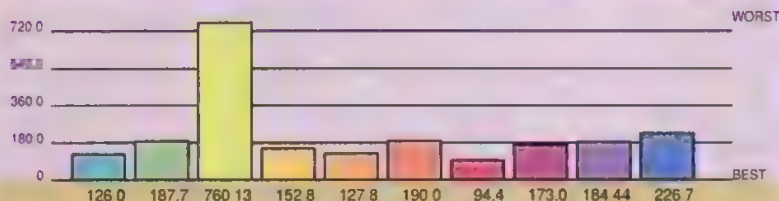
Times Roman (12-point)

Elapsed Time (seconds)



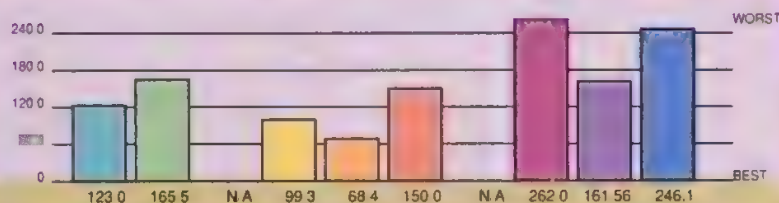
Times Roman (10-point)

Elapsed Time (seconds)



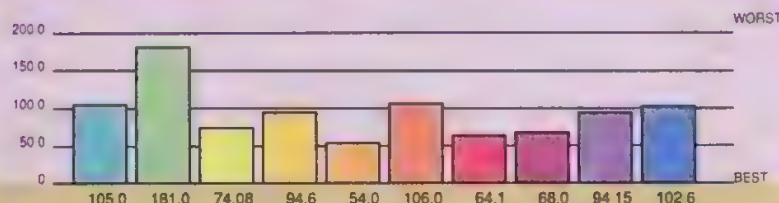
Times Roman (8-point)

Elapsed Time (seconds)



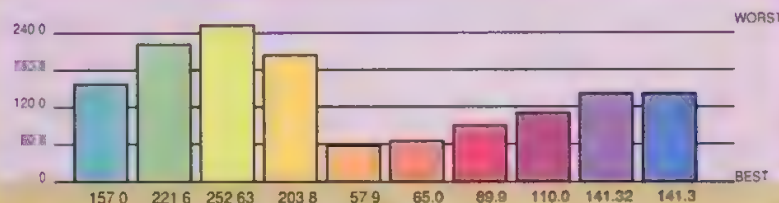
Helvetica (12-point)

Elapsed Time (seconds)



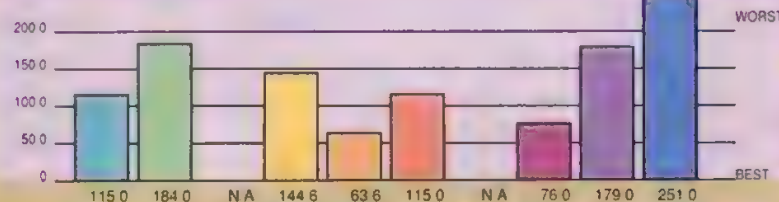
Helvetica (10-point)

Elapsed Time (seconds)



Helvetica (8-point)

Elapsed Time (seconds)



Read It! OCR
Advantex
PC OCR Plus
SPOT
Perceve
OmniPage386
Carets Deluxe OCR
Recognize!
WordScan Plus
ReadRight

CONTINUES

ligence built-in, so it can access the table for the font most similar to the one being trained, and use this as a jumping off point for creating a new font table. Dedicated functions allow you to skip ahead to the next unrecognized character, which can save lots of training time.

Time saved in this manner isn't always beneficial, though. It's easy to skip over letters that are misidentified by the program, and you'll miss the opportunity to correct the mistake. Also, the training process sometimes gets confused, so that the characters analyzed in the image are out of sync with the characters recognized by the program. The only solution is to

Suitability to Task

Monospaced Text	1			
Proportional Text	1			
Complex Documents	1			

abort training on that line, and start that line over again.

THOSE DEADLY LIGATURES

Another problem with *SPOT* is that it cannot separate letters that touch due to insufficient scanning resolution. You can use the high-order character positions in a font to store ligature combinations, but the process is tedious. Also, no more than three letters can be stored as a ligature, so in cases where four or more letters run together, you cannot get the correct information stored as part of the trained font. Because of this limitation, *SPOT* was hardly able to deal with underlined text.



FACT FILE

SPOT

Flagstaff Engineering,
1120 Kaibab Lane,
Flagstaff, AZ 86001;
(602) 779-3341, (800)
346-3627.

List Price: \$695.

Requires: IBM XT, AT, PS/2, or compatible,
640K RAM (1.5MB expanded memory
recommended), hard disk, DOS 3.0 or later.
Mouse recommended.

In Short: This trainable program has a few good features, but its quirky interface, limited number of pretrained fonts, and overall poor performance make it a relatively unattractive choice.



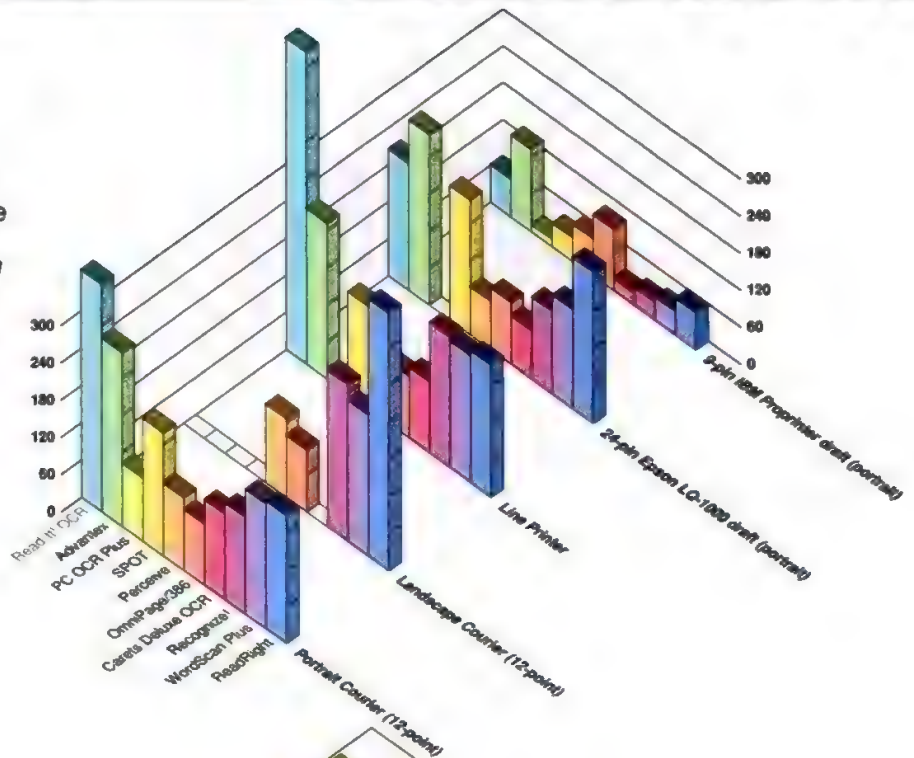
CIRCLE 418 ON READER SERVICE CARD



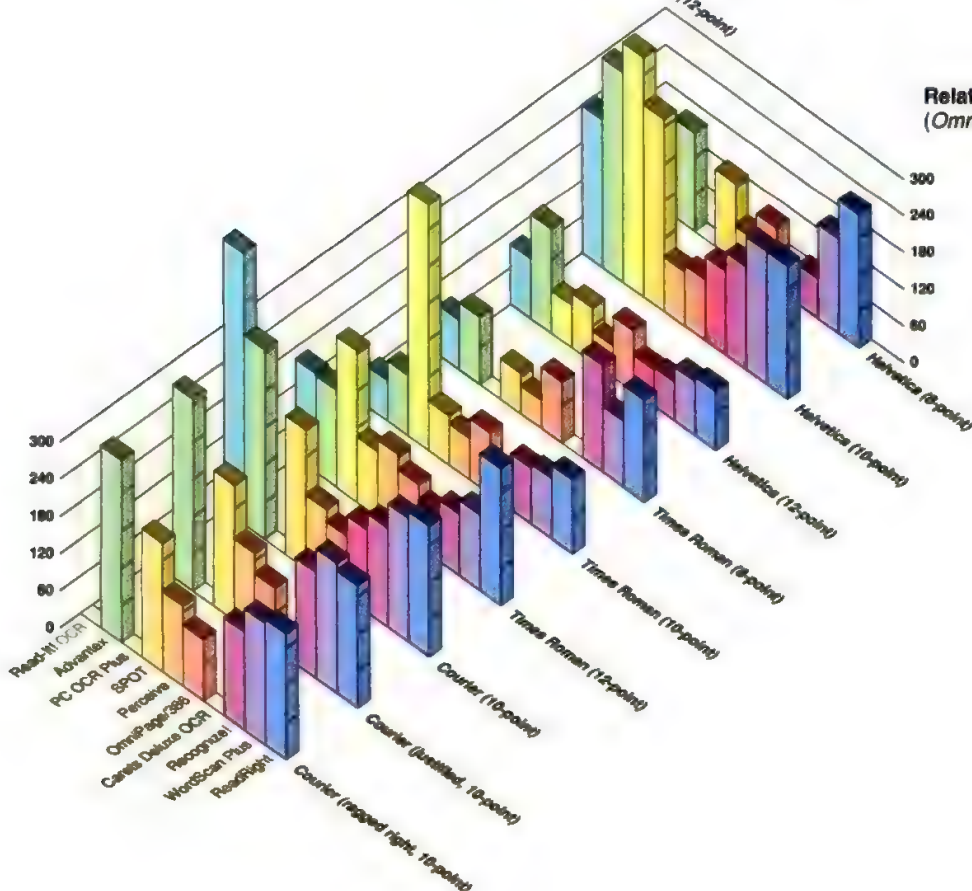
SPEED PERFORMANCE TESTS: COMPOSITE VIEW

The speed tests demonstrate the differences between 16- and 32-bit operation; *OmniPage/386* and *WordScan Plus* both have sophisticated page-decomposition capabilities, but *OmniPage/386*'s 32-bit-mode operation allows it to perform OCR more than twice as fast as *WordScan Plus* on many typefaces. As you can see from the scores on tests with small-point-size pages, it also slows down noticeably when it begins to have trouble.

Relative Times
(*OmniPage/386* = 100)



Relative Times
(*OmniPage/386* = 100)



ENDS

MATH COPROCESSORS

You know what you need
to speed up your
power applications.
There's just one more thing
you should know.



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chip off the old block.



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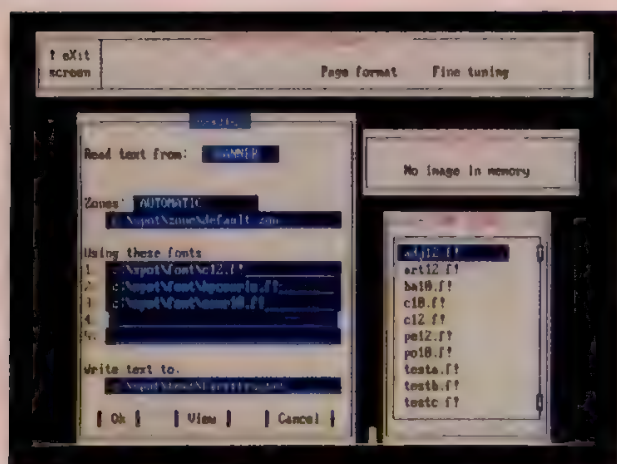
The Computer Inside.™

CIRCLE 356 ON READER SERVICE CARD

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GRAPHICS

OCR SOFTWARE



SPOT can use multiple font files to recognize mixed text on a page. If it doesn't know a font, it can choose the closest match from its existing font tables as a starting point.

The program was able to handle our multicolumn sample automatically when the right margin was ragged, but it failed to work when the text columns were justified. A company technical support representative verified that I was using the program correctly and had all the options set appropriately, but the results were still incorrect; the two columns were run together by **SPOT** as it converted the text. The program cannot handle landscape pages at all.

INTERFACE ODDITIES

The user interface makes good use of a mouse and pull-down menus. You can use Alt-key combinations to access many of the program's functions, and there is context-sensitive help. The interface ignores some widely accepted conventions. For example, **SPOT** menus often show items as "grayed-out"—displayed in a shaded rather than a solid color. In almost any other program, this would indicate that those options are not available. In **SPOT**, however, this merely means that the command is not selected; if you click on these grayed-out options, they become solid and activated.

Many of these quirks and shortcomings might be overlooked, were it not for the fact that in spite of careful training and repeated adjustments to its many options, the program was simply not very accurate. **SPOT** does contain a built-in text editor, and you have the option of going directly into this mode following a conversion so that you may view the results and make any changes. Based on our results, you are going to have plenty of corrections to make.

SPOT might be useful if considered in the absence of alternatives, but in the face of its competitors, many of which approach excellence in OCR performance, **SPOT** must be relegated to the status of an also-ran.

WordScan Plus

by Lori Grunin

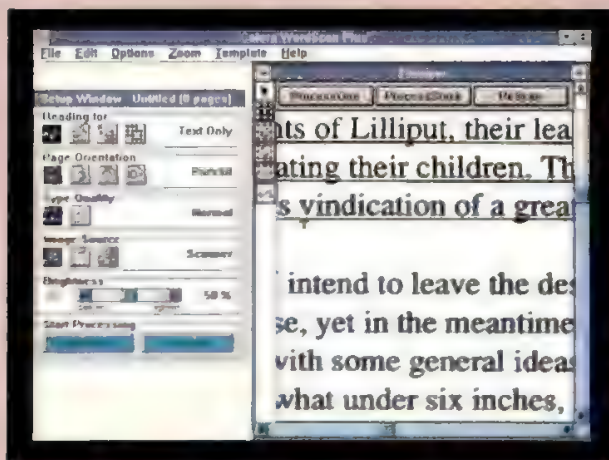
Calera Recognition Systems is no newcomer to the world of OCR—its hardware-dependent *TrueScan* was first introduced in 1988. The company's latest product, *WordScan Plus*, however, is a \$995 software-only package of unmatched flexibility for document processing. With its excellent accuracy and flexible features, it is an able representative of the next generation of omnifont OCR software.

WordScan Plus runs under *Microsoft Windows 3.0*, and so requires an 80286-based PC or better. The package takes full advantage of the environment's memory-handling capabilities; it can operate in both standard and enhanced mode, although throughput is slightly higher in standard mode. If speed is of paramount importance to you, Calera offers a \$3,995 coprocessor-board version, *WordScan Plus/AT* or *WordScan Plus/MCA*, which more than doubles throughput, and allows true background processing into the bargain. Conversely, *WordScan* offers a slightly slower but just as accurate version for only \$595.

FAILSAFE SCANNING

WordScan Plus's well-designed interface uses *Windows 3.0* to its best advantage, and puts all your important options before you. You control the input parameters—page orientation, scanning contrast (which you can set in one-percent increments using a slider) type quality (typeset or dot matrix), source (scanner, TIFF, .PCX, or fax-card file), and page content (text, graphics, mixed, or template-controlled)—from an icon-based tear-off menu.

You can preview a scan at 75, 150, or 300 dots-per-inch, trading scanning speed for detail, when setting the contrast. A resizable document preview window (which lets you view the image at full-, half-, or quarter-size, or to scale it to fit within the window) snuggles neatly next to this setup window, making it easy to adjust the contrast without jumping back and forth among screens. A thoughtful feature lets you flip the scanned image before recognition, just in case you put it in the scanner backwards.



WordScan Plus has a slick, clean interface that greatly simplifies the scanning and recognition process.

The day they
make a
laptop computer
that meets all
your needs, you'll
read about it
in a magazine.

GRAPHICS OCR SOFTWARE

A FOR ACCURACY

WordScan Plus gets an A for accuracy; it's consistently the best performer in our tests on both Courier text and proportional text down to ten points in size (though *OmniPage/386* comes close). It has no difficulty with underlined or land-

tended, this may not make a difference in your actual work.

Provided you have an automatic document feeder, it's quite feasible to start *WordScan Plus* working on a stack of documents and leave it until it's finished. To distinguish the documents, you put a blank page between them—*WordScan Plus* will then automatically break the documents apart upon saving. The only drawback is that since the software has to process each blank page as if it had text on it, it can be somewhat more time consuming. This hands-off design also makes it fairly easy to handle double-sided documents; you feed the entire stack through, then flip it over and feed it again.

WordScan Plus
redefines what we
expect from an OCR
package. Its
exceptional accuracy,
wealth of features, and
hands-off design set a
new standard.

Suitability to Task

Monospaced Text				4
Proportional Text				4
Complex Documents				4

scape text, and when its dot-matrix option was turned on it gave good results on both Proprietary and Epson samples.

Just as notable is *WordScan Plus*' sterling ability with complex pages. For standard layouts, you can create templates that designate the text, graphics, numeric, and mixed areas of a page. Without a template, the package will decompose a page as it sees fit, and it usually does a good job on simple multicolumn layouts. Unlike *OmniPage/386*, however, it won't automatically generate a template; if you want one, you will have to create it manually.

The tradeoff comes in speed; *WordScan Plus* is noticeably slower than most of its competitors. The difference is enough to be significant (it proved 30 to 40 seconds slower than *OmniPage/386* on most of our test pages), but because *WordScan Plus* lets you scan in multiple documents unat-

DISTINGUISHING FEATURES

Beyond the basics, *WordScan Plus* is distinguished from the rest of the letter-crunching crowd by some innovative features, notably its pop-up verifier and style sheets. After a page or document has been recognized and run through the customizable internal lexicon, *WordScan Plus* loads the pages plus the unrecognized word and character flags into the pop-up verifier. This is a basic text editor with a twist; as you jump to each ambiguous character or word, it displays the bitmapped image of the word or character, allowing you to make corrections on-screen without ever having to look down at the hardcopy original.

In many cases, the verifier can cut down on clean-up time considerably. Its "Whiteout" function, which gets rid of the stray characters usually caused by noise from an embedded graphic, is especially useful. Unfortunately, as with most OCR packages, the verifier doesn't always know what it doesn't know—it occasionally marks correct words or characters as unsure, and misses incorrect ones. More problematic, when the ambiguous character is a fractured character, it shows only a piece of the character in question with the rest grayed out, making it difficult to recognize and correct.

feature; for instance, it lets you change all centered text to flush left, all right-justified text to ragged, force the type size to 12 points, and double-space the lines according to the format you want to use for the finished document.

WordScan Plus is not without its idiosyncracies. When saving, you can't override the software's default file extensions, and nowhere in the documentation does it specify what the proper extensions are. When you use the verifier, you can go to the next page or to a specified page, but not to the previous page. Though template creation is fairly straightforward, the text zones you create look different at every zoom level; a rectangle you mark off at the fit-in-window level looks like it's cutting off text in the full-size view.

Nevertheless, *WordScan Plus* redefines what we expect from an OCR package. Though it's not the fastest, its exceptional accuracy, wealth of features, and hands-off design set a new standard for its category. If you regularly scan a variety of documents, it's probably your best bet. And if you can do without the pop-up verifier and style sheets, *WordScan* gives you much the same capabilities for only \$595.

Mitt Jones, Bruce Brown, Alfred Poor, and Bill O'Brien are contributing editors of *PC Magazine*.

Lori Grunin is the project leader in charge of graphics products at PC Labs. **David Dean** is a PhD candidate in anthropology at the CUNY Graduate School and writes a monthly column on fonts for *PC Publishing magazine*.

FACT FILE EDITOR'S CHOICE

WordScan Plus

Calera Recognition Systems, 2500 Augustine Dr., Santa Clara, CA 95054; (408) 986-8006. (800) 544-7051.

List Price: *WordScan Plus*, \$995; *WordScan Plus/AT* or *WordScan Plus/MCA*, \$3,995; *WordScan*, \$595.

Requires: IBM AT or compatible, 2MB RAM (386-based PC, 4MB RAM recommended), hard disk, mouse, DOS 3.1 or higher, Microsoft Windows 3.0.

In Short: Though it's not the fastest in our roundup, *WordScan Plus* redefines our expectations of OCR with its exceptional accuracy and the flexibility of its options.

CIRCLE 419 ON READER SERVICE CARD



Here it is in a magazine.

*NEC introduces the 12-pound
ProSpeed™ SX/20 laptop computer.*

Is it really possible to have all
your needs met by just one 12-
pound laptop?

Good question.

For which we at NEC
have a great answer.

The ProSpeed SX/20.

A small, lightweight
386SX laptop that utilizes a
unique modular design to meet all
your computing needs. Whether you
require a high-performance portable
or a fully configured desktop system.

Technically speaking, the
ProSpeed SX/20 comes equipped
with up to 5MB of RAM and a
40MB hard disk drive, and runs
at a blinding 20MHz pace.
There's also 3 hours of battery
life. Now all
this looks good on paper.

But how does it look on a computer?



Well, thanks to a CRT quality LCD
screen with VGA resolution, the
answer is crisp and clear.

Which brings us to the sensitive
topics of expandability and con-
nectivity. In other words, all that

you gain in a desktop but usually lose
in a laptop.

The exception, of course, being the
ProSpeed SX/20. Its unique Docking

Station™ allows you to easily make
the transition between outside-the-
office portable and inside-the-
office computer, while providing
the connectivity and expansion
capabilities you'd only expect
from a desktop.

So, now that you've read about it
in a magazine, when can you see the
one 12-pound laptop that can meet
all your needs? The day you go to
your NEC dealer and try one.

For product literature or location of your near-

est dealer call 1-800-826-2255.

Introducing



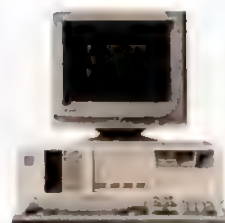
TEMPO 286/12 \$1399*

12MHz 80286 CPU
12MHz or 8MHz operating speeds
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Small or large footprint
(3 or 5 drive bays)
Socket for 80287 math coprocessor
Enhanced 101 keyboard



TEMPO 286/16 \$1499*

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Small or large footprint
(3 or 5 drive bays)
Socket for 80287 math coprocessor
Enhanced 101 keyboard



TEMPO 386/25 \$3499*

25MHz 80386 CPU
Three operating speeds
1MB of 32-bit RAM
(expandable to 16MB)
64KB static RAM cache
Socket for Intel® or Weitek®
math coprocessor
Enhanced 101 keyboard



So what's the Tempo™?

The Tempo is very fast. Very solid. Very inexpensive. And very Everex™.

It's a new line of IBM®-compatible PCs that beats up on the under-powered, over-priced boxes the big boys dish up. Dances circles around unsupported off-shore computers. And makes people looking for very good deals very happy.

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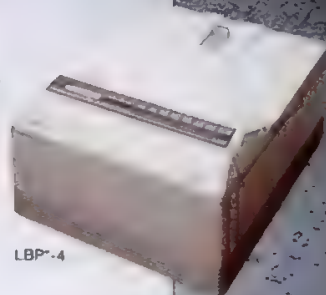
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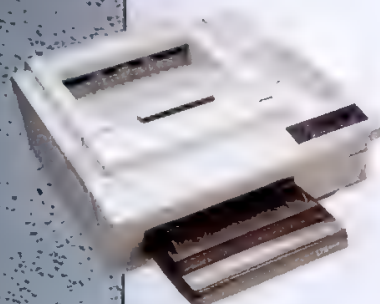
CIRCLE 113 ON READER SERVICE CARD

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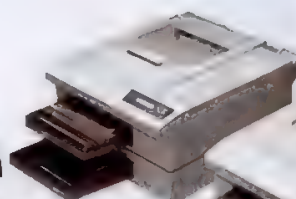
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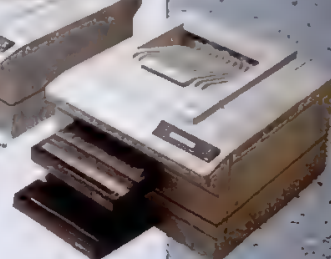


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CIRCLE 155 ON READER SERVICE CARD

by
Jeff Prosis

Utilities

Early converts to OS/2 and Presentation Manager know what it's like to be all dressed up with no place to go. Although major PM applications are finally making it to market, their numbers don't begin to compare with the tens of thousands of existing DOS applications. This is one reason you'll appreciate PMCARD—short for CARDFILE for Presentation Manager.

PMCARD stores and organizes names, addresses, and telephone numbers. Its databaselike search features make finding and retrieving information a snap. If you have a modem, PMCARD will dial the phone for you. And best of all, you get all the advantages of running in the Presentation Manager environment, where you can run multiple instances of the program, minimize it to icon form when it's not needed, and use it without having to learn a complicated set of DOS commands.

Longtime readers will recognize that PMCARD is in some ways similar to my previous CARDFILE, a DOS program that appeared in *PC Magazine's* October 13, 1987, Utilities column. Reshaped to fit the Presentation Manager/CUA (Common User Access) mold, however, the new version adds several new features, including a better and more efficient scheme for managing memory and an ability to cut and paste between cards—even between PMCARD and other PM applications.

Both in its ready-to-run form, PMCARD.EXE, and in its source code files (PMCARD.C, PMCARD, PMCARD.DEF, PMCARD.H, PMCARD.RC, PMCARD.RES, PMCARD.ICO, PMCARD.OBJ), PMCARD can be downloaded from PC MagNet's Utilities library. See the instructions given in the sidebar "PMCARD by Modem." You'll need OS/2, Version 1.2 or later.

GETTING STARTED

The full syntax for PMCARD is simply

```
PMCARD {filename}
```

The optional *filename* command-line pa-

CARDFILE for the PM: It's Time to Retire Your Rolodex

■ More than an update of our popular DOS utility, the PM version of CARDFILE shows why we'll all be more productive with OS/2.

parameter is simply the name of a data file to be loaded at start-up. You can also designate a default data file from PMCARD's Settings menu (see the Configuration section below). The option of entering the file name on the command line (or in the Parameters box in PM's New Program dialog box) is especially handy when you want to run multiple instances of PMCARD with different data files. You might, for example, set up one card file for personal contacts and one for business contacts. By starting two or more copies of PMCARD running with different files, you'll have the electronic equivalent of keeping several Rolodexes sitting on your desk.

Figure 1 shows a PM screen with PMCARD running. The four buttons at the bottom of the window, Srch, Dial, Prev, and Next, provide shortcuts to PMCARD's most commonly used functions. Srch initiates a text search; Dial dials a highlighted phone number or pops up a dialog box from which you can dial any number that is displayed on the card or entered manually; Prev moves back one card in the stack; and Next moves forward one card. Pressing PgUp or PgDn is equivalent to clicking on Prev or Next.

PMCARD's many options and commands can be accessed through the pull-down menus at the top of the window. The manual-page sidebar outlines the menu structure and provides a brief explanation of each command. Most are self-explanatory; those that aren't are described in more detail in subsequent sections of this article. The Search and Dial menu options under Options are functionally identical to the Srch and Dial buttons at the bottom of the window.

A blank text window will greet you the first time you run PMCARD. At the bottom of the window, the line of text that reads "1 of 1" tells you that there is currently only one card in the stack and you're looking at it. These numbers will change as you add cards and click on the Prev and Next buttons (or hit the PgUp and PgDn keys) to work your way through the card stack you develop.

To create your first card, move the mouse pointer to the upper-left corner of the window and click the left mouse button. A vertical bar cursor will appear on the screen. Just enter the information you want to keep on file the same way as you would with a text editor or word processor. Each card can hold up to six lines of text, and each line can be as long as OS/2's proportional system font will accommodate—roughly 60 characters, given an average mix of letters. When you reach the right margin, PMCARD will sound a warning beep to let you know that you can't go further.

Text can be entered in any form or order you wish. When you tell it to dial, PM-

Utilities

Figure 1: The PMCARD window contains seven major elements: pull-down menus to access commands; the window where text is displayed; Srch, Dial, Prev, and Next buttons; and a line of text that shows the number of cards on the stack and the one displayed.



CARD scans the card for numbers that appear to be phone numbers, using an algorithm designed to sift out such numbers as ZIP codes and street addresses. You can put as many phone numbers as you wish on each card.

Editing the text of a card is as simple as using the mouse to reposition the cursor in the text area and typing away. While you're editing, the Ins key toggles insert mode on and off; Del and Backspace delete the character to the right and left of the cursor, respectively; and the Arrow keys move the cursor. Home and End move you quickly to the beginning and end of a line.

To perform block operations, mouse-select the block of text to be operated on and use the Cut, Copy, Paste, and Clear options under the Edit menu. Cut deletes the block and copies it to the clipboard; Copy copies it to the clipboard while leaving it intact on the card; Paste imports text from the clipboard; and Clear deletes the text without copying it to the clipboard. These functions are not limited to cutting and pasting between PMCARD entries: you can also use them to move text between PMCARD and other PM applications that support clipboard operations.

STACK MANIPULATIONS

To insert a new card into the stack (simply an ordered collection of cards) select the Insert Card option from PMCARD's Edit menu, or hit the F4 accelerator key. Newly inserted cards are initially blank. You can insert blank cards one at a time and then enter text as you go along, or you can insert several in succession and go back to enter

text at your leisure; it doesn't matter which technique you choose. PMCARD treats every card in the stack without regard to whether or not there is any text currently associated with it.

You can delete a card from the stack with the Delete Card option found under the Edit menu. This command removes the card currently displayed from the stack and decrements the total card count by one. If

Editing the text of a card is as simple as using the mouse to reposition the cursor and typing away.

you accidentally delete a card you didn't intend to, don't panic. Just select Undo Delete from the same menu *before you delete another card*; the card will be inserted back into the stack.

The Undo Delete command also serves a second purpose. If you want to move a card from one position in the stack to another, simply delete it, move to the position in the stack where you'd like the card to appear, and select Undo Delete. That will "file" the card in its new position. The secret is that Delete Card doesn't really delete the card at all, but simply copies

it to a temporary holding buffer, instead. Undo Delete does just the opposite: it inserts a new card in the stack and copies the buffered text to it.

For those who prefer using a keyboard rather than the pull-down menus, Delete Card and Undo Delete are also assigned to the accelerator key combinations Ctrl-F4 and Shift-F4, respectively. As you move about the card stack, adding and deleting cards, the Goto . . . option under the Options menu (which can also be invoked with the F8 key) will get you to any point in the stack quickly if you know the number of your destination card.

FILE OPERATIONS

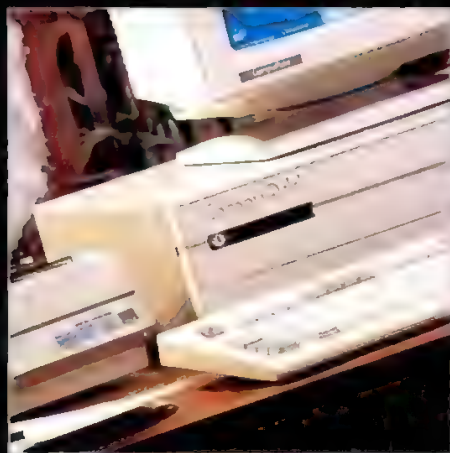
After creating or making changes in a card stack, use the Save option from the File menu (or the F3 key) to save it to the disk. The first time you save a file, PMCARD will ask you for a filename. Thereafter, PMCARD will save under the same filename unless you invoke the Save as . . . option to change it. The directory in which the file will be saved is displayed in the Save As dialog box. To change drives or directories, double-click on the corresponding entries in the list boxes above the entry field. The . . . entry in the Directory list box moves you up one directory level from the current directory.

To recall a file, select Open . . . from the File menu. Then point PMCARD to the desired file, either by typing its name in the box near the bottom of the dialog box or by selecting the filename from the File-name list box. If you've used Presentation Manager or Microsoft Windows programs before, such file-open dialog boxes are already familiar. Simply spell out the path to a file by specifying a drive, directory, and filename. To select a file from the File-name list box, you simply find the one you want and double-click on it.

PMCARD will tell you if it can't find or can't open the file you specify. If this happens, check that the path and filename are valid. Remember that if a file specification isn't preceded by a backslash, it is assumed to be relative to the current directory, whose name is displayed above the entry field.

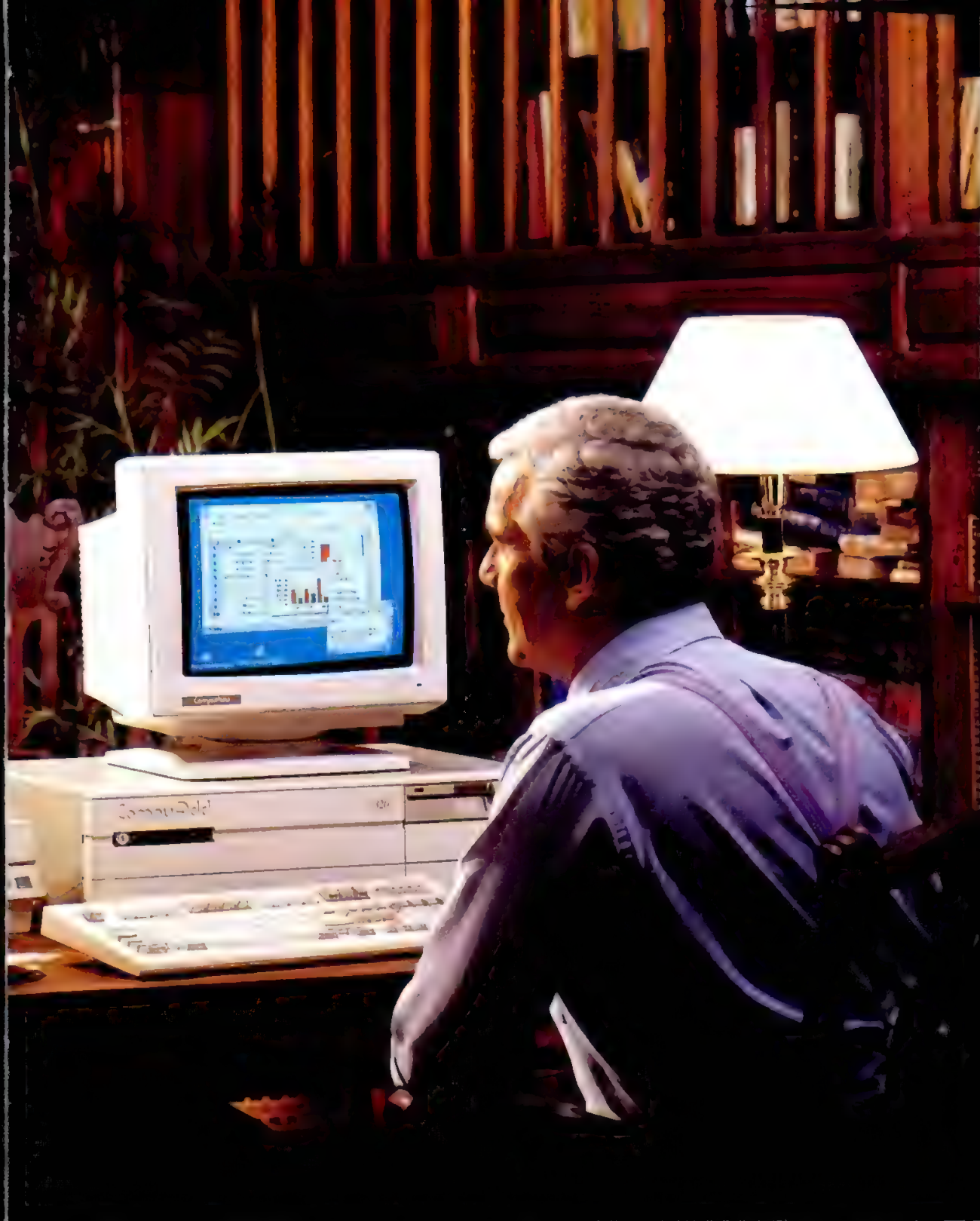
An error will also occur if you attempt to open a file that was not created by PMCARD. Usually, this just means you clicked on the wrong filename. Occasionally, it may happen because a legitimate data file has somehow been corrupted. Needless to say, it's prudent to keep backup copies of important files.

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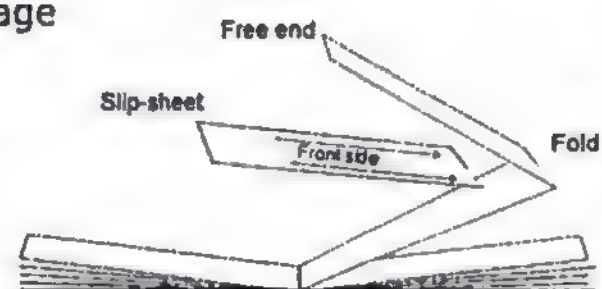
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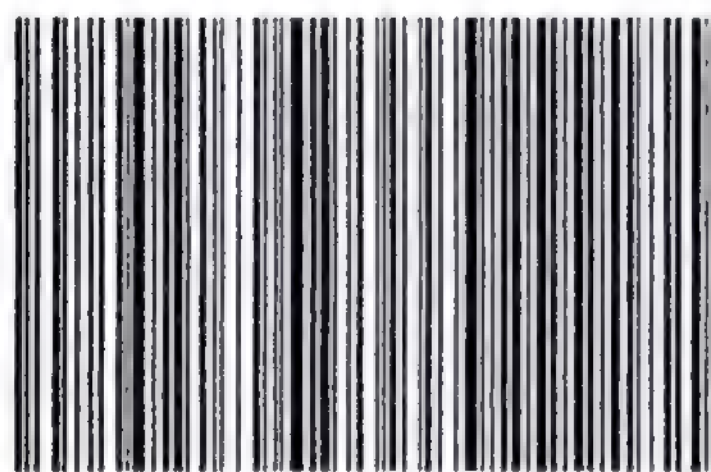
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GbsSlipSheet-001

Inverted Foldout slip-sheet

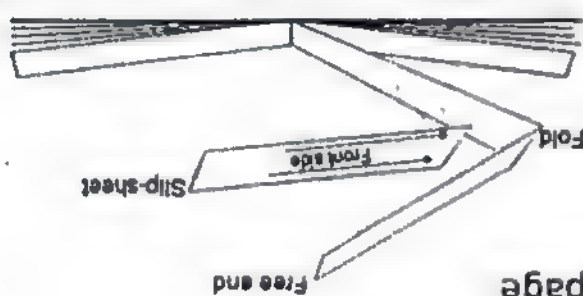
Folded edge of the page

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2. Arrow pointing to the fold

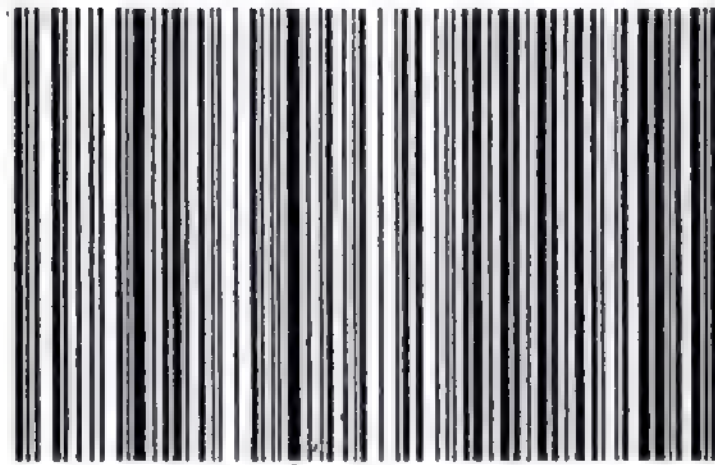
3. Slice the folded edge

4. Close the page and slip-sheet



1. Follow instructions on the other side

Inverted Back



GbsSlipBack-001B

Back

1. Follow instructions on the other side

CompuAdd's NEW DX Success Kit \$1995

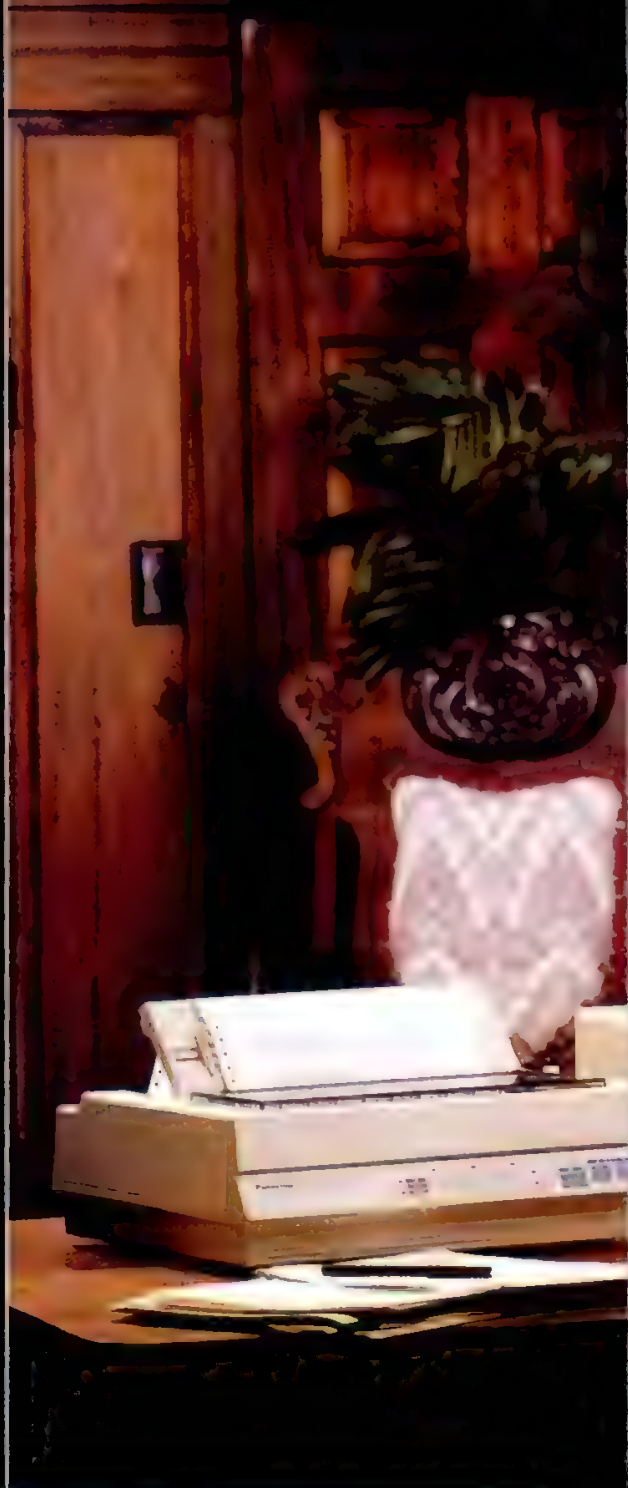
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Utilities

The New option under the File menu lets you clear the current card stack without opening a new file. You're left with a stack that contains a single blank card, just as if you were starting from scratch. For safety's sake, if you select New without first saving the current card stack, PMCARD will give you a chance to save the stack before it erases it from memory.

SEARCHING

To search for a card that contains a particular text string, press the Srch button at the bottom of the window (or select the Search . . . option from the Options menu). Hitting F5 will accomplish the same result without the menus. Then enter the text string you're looking for in the dialog box entry field. If you've performed a search previously, the old search string will appear in the entry field as a default. To initiate the search, click on OK. PMCARD will index forward to the next higher-numbered card that contains the text you're seeking. If your text string can't be found, a "Not found" message will be displayed.

After defining a search string, you can quickly move backward and forward through the card stack, displaying only those cards that contain the specified text. You do this with the Find Prev and Find Next menu selections located under Search . . . in the Options menu. To save time, you can also invoke these functions with the F6 and F7 keys.

You can specify whether searches should be case sensitive or not by checking or unchecking the Case-Sensitive box in the Search dialog box. By default, the box is unchecked, so searches are performed without regard to case. "William p. flanagan" and "William P. Flanagan" would be equivalent. If you check the box, PMCARD will find matches only with those cards that contain the specified text in the case you entered it.

DIALING

If you have a modem, one of the PMCARD features you'll find most useful is its ability to dial the phone for you. By default, PMCARD is configured to work with Hayes modems and third-party modems that understand the AT command set. If your modem isn't Hayes-compatible (or if it's connected to a different COM

port), you'll need to make a couple of configuration changes before dialing for the first time. The "Configuration" section below will show you how to make these changes.

When you press F9, click on the Dial button at the bottom of the PMCARD window, or invoke the Dial menu option under Options, PMCARD searches the current card for text strings that resemble phone numbers. It then displays a dialog box similar to that shown in Figure 2. The box contains an entry field and three buttons, labeled Dial, Cancel, and Next. If the card underneath the dialog box contains no phone numbers, the entry field will be empty. If it contains one phone number, that number will appear in the entry field. And if it contains more than one phone number, the first number listed will appear in the entry field and the Next button will display each number in turn. You can also enter a number manually. When the number you want is displayed in the entry field, push the Dial button (or hit F9) to dial it.

There is always a certain amount of guesswork involved when PMCARD scans a card for phone numbers, for a card might (indeed, usually will) contain other numeric entries as well. PMCARD knows enough to filter out numbers that are exactly five digits long (thus eliminating five-digit ZIP codes) and five-digit numbers followed by a hyphen and four digits (the signature of a nine-digit zip code). It also filters out numbers less than five digits long. Everything else is a possible phone number as far as PMCARD knows.

You can enter phone numbers on your cards in virtually any format you like and include symbols such as hyphens, spaces,

commas, and parentheses as long as you don't enter them in a ZIP code-like format. If you enter more than one phone number on a single line, however, you must be sure to include something—a semicolon or a text string, for example—between the two numbers so that PMCARD can tell where one stops and the next one starts. Spaces, commas, hyphens, and parentheses are not sufficient to separate two phone numbers on the same line.

You can bypass the Dial dialog box and dial a phone number directly by mouse-selecting the number on screen and clicking on Dial. You highlight the number just as if you were going to copy it to the clipboard. This may be faster than going through the Dial dialog box when you want to dial the fifth of five phone numbers displayed, for example, or if you want to dial only part of a number displayed in the window. It also gives you a way of dialing an extension that is less than five digits long or a legitimate phone number that PMCARD for some reason doesn't recognize as such.

You can have PMCARD precede every number it dials with a special prefix by entering it under Dial Prefix in the Settings dialog box. Prefixes can be up to six digits long. If the phone system where you work requires you to enter a one-digit access code to get an outside line, this feature will keep you from having to include the prefix on every card. Then, too, some systems require a short pause between the access code and the number. If yours is one of these, simply add a comma to the end of the dial prefix string. You can also use a comma with a nonprefixed phone number. On Hayes modems, a comma tells the mo-



Figure 2: In response to a Dial command, PMCARD scans the current card for text strings that appear to be phone numbers and pops up this dialog box. In it the entry field displays the numbers and three buttons—Dial, Cancel, and Next—let you perform the function you want.

Utilities

dem to pause for approximately 2 seconds.

After it dials a number, PMCARD displays the message, "Pick up the handset and press OK." When you do, PMCARD disconnects the modem from the line so that you can use the phone. Be sure to pick up the handset *before* you press OK; if you don't, the connection will be lost.

CONFIGURATION

The Settings . . . selection under the Options menu allows you to customize PMCARD for your personal use. The Settings dialog box contains the following controls:

- Radio buttons for specifying your modem's COM port. The options are COM1, COM2, COM3, and COM4.
- Radio buttons for selecting the communications parameters PMCARD will use to transmit commands to your modem. The default is 1200N81, that is, 1,200 bits per second, no parity, 8 data bits, and 1 stop bit. The bps rate can be set to 300, 1,200, 2,400, 4,800, or 9,600; parity can be set to none, odd, or even; data bits can be 7 or 8; and stop bits can be 1 or 2.
- Entry fields for specifying the commands that tell your modem to dial and to hang up. The dial command default is ATS11=55DT. The hang-up command defaults to ATH0. Both of these codes are compatible with Hayes modems. If your modem isn't Hayes-compatible, just enter the appropriate commands in the entry fields. Also, if you have a Hayes-compatible modem but use pulse dialing rather than touch-tones, you should change the ATS11=55DT entry to ATS11=55DP or simply to ATDP.
- An entry field for designating the name of a card file to be loaded each time PMCARD is started. It's a good idea to include the drive and pathname along with the filename so that you can start PMCARD from any location on your hard disk.
- An entry field for specifying a dialing prefix. The number you enter here is automatically transmitted before any phone number you dial.

A screen shot of the Settings dialog box is shown in Figure 3. Note the small box labeled Save Settings, in the lower-right corner. If Save Settings is checked when you OK the configuration changes you've made, those settings will be saved to disk

in OS/2's OS2INI.SYS file and will be recalled automatically the next time you start the program. If the box is not checked, any changes you make will be retained only for the duration of your current session, and when you run PMCARD again the configuration settings will revert to their defaults or to the values they had when they were last saved. Cancel closes the Settings window and discards all current changes.

By default, PMCARD uses serial port COM1 and initializes it for 1,200 bps. Although parity, data bits, and stop bits are usually important only if you're trying to communicate with a remote modem, the COM port and bps are always critical.

only as much space to storing the text of a card as is required and not a byte more. Since there's no wasted space, you can create as many cards as the 64K text buffer will physically hold. Typically, you'll have room for several hundred cards—far more than the 255-card limit the original CARDFILE program imposed.

The absolute limit on the number of cards that can be stored in one file is 999. The reason is that in its global data segment PMCARD maintains two arrays, which hold the size and offset address (relative to the base of the text buffer) of each card. Both of these arrays are fixed-length and can hold only 999 elements. In prac-

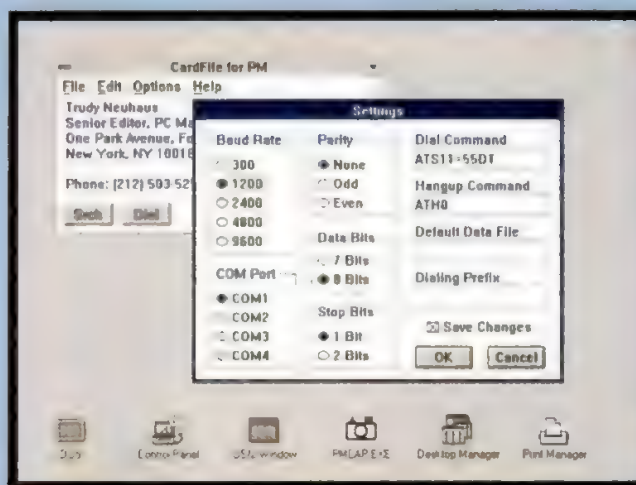


Figure 3: The Settings dialog box allows you to designate your modem COM port, modem communications settings, dial and hang-up commands, the dial prefix (if any) to precede each number, and the name of a data file to be loaded each time PMCARD is started.

Make sure that your modem is connected to COM1 and will operate at 1,200 bps before you dial a phone number the first time or change these parameters in Settings to make PMCARD compatible with your hardware setup.

One final note about dialing: the ATS11=55DT command does more than simply dial the phone. It speeds up the dialing process by telling your modem to insert a 55-millisecond pause between digits (the default is a 70-millisecond delay). If this causes compatibility problems with your modem, simply edit the S11=55 substring out of the dial command in the Settings dialog box.

MEMORY MANAGEMENT

PMCARD uses a simple but effective scheme to manage memory. At start-up, it sets aside a 64K data buffer for text. Unlike the DOS CARDFILE, which reserved a fixed amount of space within the buffer for each card, PMCARD uses variable-length records. In other words, it dedicates

pace, you'll hardly ever bump into the limit imposed by the array size; unless your cards contain little or no text, you'll hit the 64K data limit first.

Why use fixed-length arrays at all, when storing records as a linked list would eliminate the need for separate arrays to store sizes and addresses? To maximize speed. Because of the way it stores card sizes and addresses, PMCARD is equally fast in accessing the lowest card in the stack, the highest, or any card in between. If text were stored in linked list format, on the other hand, and you wanted to find the "nth" card, PMCARD would have to "flip through" all of the cards until it found the right one.

Thus the compromise. PMCARD imposes a reasonable limit on the number of cards that can be stored in one file, but offers speed in return. It's so fast, in fact, that you should never find yourself waiting for it to complete an operation.

There's another, more subtle reason why PMCARD puts a 64K limit on text.

Utilities

OS/2 1.2, which will run on 286, 386, or 486 machines, imposes the segmented style of the 286 on all of the programs that run under it. The maximum segment size on the 286 is 64K. Even in protected mode, it's difficult to deal with objects that span more than one segment. This limitation will disappear with the advent of OS/2 2.0, which will support the extended segment sizes of the 386 and 486.

To find out how much memory is available for text at any given time, you simply select Memory . . . from PMCARD's Options menu. A dialog box will pop up, showing a count of bytes used, bytes free, and bytes available in the text buffer. Bytes used is the number of bytes currently allocated to text in the text buffer; bytes free is the number of unused bytes in the buffer; and bytes available is the number of free bytes currently available.

Bytes free and bytes available may differ if you've edited existing cards or added new ones since you last saved the file. PMCARD sometimes allows memory to become fragmented, in the interest of minimizing processing time. Thus, for example, if you edit a card that contains 200 bytes of text down to 175 bytes, PMCARD overwrites the old text of the card with the new, but until the next time you save the file, the program does not take the time to shift all the data above that card down in memory in order to free up the 25 unused bytes. Shifting it immediately would cause a delay every time you edited a card. Similarly, if the size of a card increases during editing, PMCARD stores the text of the card at a new location in the buffer and changes the corresponding entry in the address array. The old region of memory where the card was stored isn't used again until the data in the buffer is packed.

To reclaim the unused space, simply save the file; after saving, bytes free and bytes available should be identical. And should you ever encounter an error message indicating there's not enough space left in the text buffer to store the changes you've made to a card, save the file to free up some room and try again.

PROGRAMMING

Like most Presentation Manager programs, PMCARD is written in C. It was developed and compiled under Microsoft

C 5.1. All source code modules are available for downloading from PC MagNet.

The source modules include: PMCARD.C, the C source listing; PMCARD, the Make file; PMCARD.DEF, the module definition file; PMCARD.H, the header file; PMCARD.RC, the resource script file; PMCARD.RES, the resource file; PMCARD.ICO, the binary file where PMCARD's bitmapped icon is stored; PMCARD.OBJ, the compiled object file; and PMCARD.EXE, the compiled and linked executable. To compile the code using Microsoft C 5.1, you must use CIL.EXE in place of C1.EXE. These are the components of the compiler that per-

PMCARD relies rather heavily on an object known as the multiple-line entry field or MLE.

form preprocessing. The easy way to make the switch is to rename C1.EXE to something else and CIL.EXE to C1.EXE. If you don't, the compiler will bomb with an "Out of near heap space" message. If you compile with C 6.0, use a /B1 switch instead.

The source code is far too complex to discuss in detail here. PMCARD.C by itself is more than 30 pages long. If you've never seen a Presentation Manager program, however, browsing through this file will provide an informative glimpse into the world of PM programming.

A typical PM program contains a collection of routines that process messages placed in the program's message queue by an event such as a mouse click or button press. In PMCARD, the gigantic ClientWndProc function handles messages sent to the PMCARD window, which, in PM terminology is known as the *client window*. When the Srch button is pressed, for example, ClientWndProc gets control and, using a switch statement, passes control to the SRCH_BUTTON routine. If Settings . . . is selected from the Options menu, ClientWndProc's IDM_CONFIG routine is executed.

In general, for each window that appears on the screen (including the dialog

boxes that PMCARD creates) there is a C function that processes messages to that window. Just as ClientWndProc serves the client window, SearchDlgProc serves the Search dialog box, DialDlgProc serves the Dial dialog box, and so on. If you're interested in PM programming, a good place to start is Charles Petzold's book *Programming the OS/2 Presentation Manager*, published by Microsoft Press. It's the do-all, tell-all guide to Presentation Manager programming, and it's a great vehicle for introducing yourself to the ins and outs of the PM programming interface.

PMCARD relies rather heavily on an object (new in OS/2 1.2) known as the *multiple-line entry field*, or MLE. A close relative of the single-line entry fields that often appear in PM and Windows programs, the MLE provides a built-in facility that makes text entering and editing a snap. To handle text editing, PMCARD creates an MLE with WinCreateWindow. When you move the mouse pointer into the text area, PM takes care of everything that happens inside the unseen borders of the window. When you're finished, PMCARD sends messages to the MLE to copy the edited text to its own 64K text buffer.

There are no fewer than 47 defined messages that an application can send to an MLE, and there are 14 messages that an MLE can send to an application. All of these are documented in Volume 4 of Microsoft's *OS/2 Programmer's Reference*, Version 1.2.

PMCARD uses approximately a dozen of these messages. For example, the following two statements export text from an MLE to a user-defined buffer—in this case, one internal to PMCARD. The first one tells PM where the user-defined buffer is and the second one performs the copy.

```
WinSendMsg (hwndMLE,
    MLM_SETIMPORTEXP, MPFROMP
    (BufferPtr +
    usCardOffset[sCardNo],
    MPFROMP (2048));

WinSendMsg (hwndMLE, MLM_EXPORT,
    MPFROMP (&iOffset),
    MPFROMP (&iByteCount));
```

WinSendMsg is a PM function that sends a message to a PM window, and hwndMLE is the handle to the MLE, which is obtained from WinCreateWindow. MLM_SETIMPORTEXP and MLM_EXPORT are the message identifiers. MPFROMP is a macro that forms a

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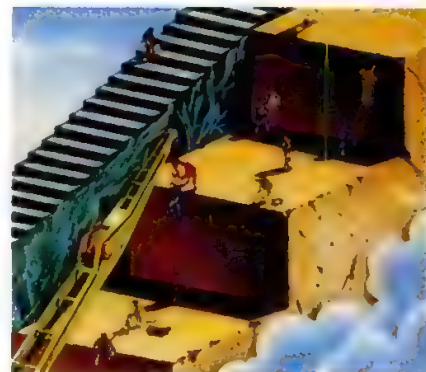
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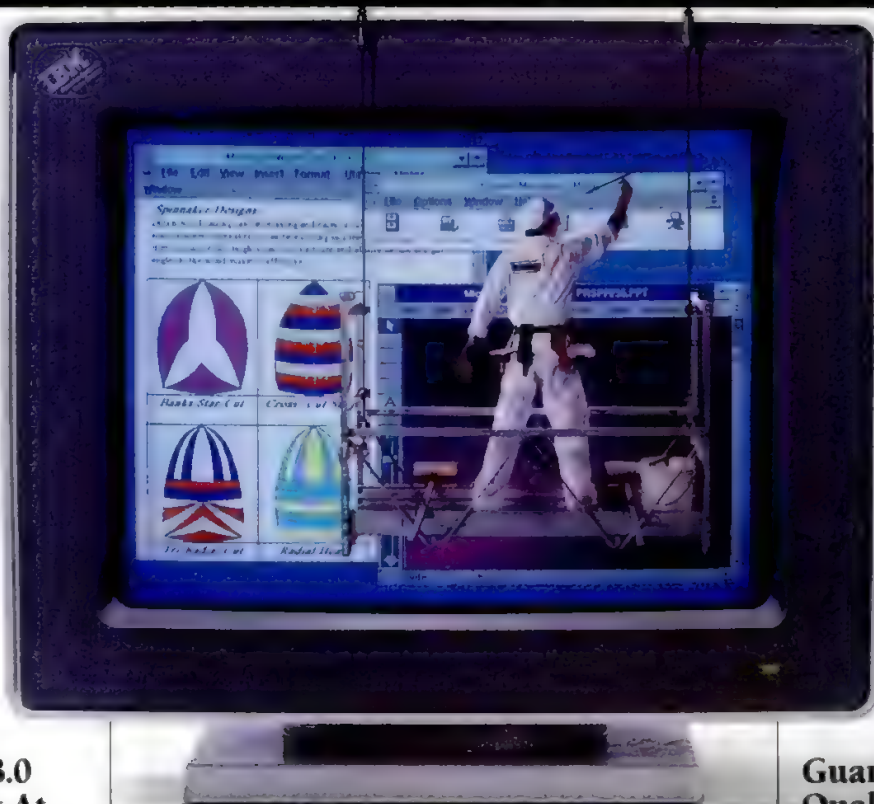


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The programs in *PC Magazine* are available on PC MagNet.

To join PC MagNet, set your communications software for either 300 or 1,200 bits per second, 7 data bits, even parity, 1 stop bit, and full duplex. To find the nearest number, dial (800) 346-3247. In Canada call (800) 635-6225 (voice only). When the modem connects, press Enter. At the HOST NAME prompt, enter PHONES. Follow the menus and note the closest number. If you have a CompuServe account type G PCMAG at any ! prompt.

After you have found the phone number nearest you, hang up and redial using that number. When you connect with PC MagNet, press Ctrl-C. At the HOST NAME prompt, enter CIS. At the USER ID prompt, enter 177000.5000. Enter PC*MAGNET at the PASSWORD prompt and Z10D9000 at the ENTER AGREEMENT NUMBER prompt. For Customer Service, call (800) 848-8990; outside the United States, call (614) 457-8650.

To download PMCARD.EXE, its assembly language source listing and BASIC listing, log on to PC MagNet. Enter GO UTILITIES or choose PC MAGAZINE UTILITIES from the top menu, then DIRECT UTILITY DOWNLOAD from the next menu. Enter the filename, then select a file. Answer yes (Y) to DO YOU WISH TO DOWNLOAD? Press Enter for the transfer protocols. Choose one and download the file.

You don't have to be a member of CompuServe to access PC MagNet. It costs \$12.80 an hour for 1,200/2,400-bps service and \$6.30 for 300-bps, via MasterCard, VISA, or American Express. These programs can be copied but are copyrighted and are made available only for noncommercial use. You may make copies for others as long as no charge is involved, but making cop-

CONTINUES

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Jeff Prosis

PMCARD Command

October 30, 1990 (Utilities)

Purpose:

An OS/2 Presentation Manager utility that stores and retrieves names, addresses, and telephone numbers. The program can search its data file for a specified string and, if a modem is connected, it can dial the phone.

Format:

PMCARD [*filename*]

Remarks:

PMCARD can be given a card data *filename* either on the command line or in its Settings menu. If you run the program for the first time without specifying a filename, it will present a blank card. Information can be entered in any form, up to six lines per card. New blank cards can be inserted at a particular position by selecting Insert Card with the mouse or by pressing F4. The clipboard commands can be used to copy information to additional cards and to exchange information with other PM applications. Phone numbers may include hyphens, spaces, commas, and parentheses; two phone numbers listed on the same line must be separated by at least one other character than these.

There are three ways to search for user-specified text strings: click on the Srch button, select Search from the Options menu, or press F5. You can specify whether searches should be case sensitive or not by checking or unchecking the case sensitive box in the Search dialog box. The default communications parameters are COM1, 1,200 bits per second, no parity, 8 data bits, and 1 stop bit. You can reconfigure and save these and the Hayes-compatible dial and hang-up command strings from the Settings menu. Thereafter, if you connect a modem, you can call a number by using the Dial button or F9. The number you wish to call is displayed in the dialog-box entry field and may be changed or entered manually.

The major PMCARD mouse-selectable commands, together with keyboard alternatives, are as follows:

CONTINUES

Command	Key	Description
FILE		
Save	F3	Save the card stack
Save As...		Save the card stack under a new filename
Open...		Clear the card stack and open a new file
New		Clear the card stack without opening a new file
Exit		Quit the program
EDIT		
Cut	Shift-Del	Delete the currently selected text from the card and copy it to the clipboard
Copy	Ctrl-Ins	Copy the currently selected text to the clipboard
Paste	Shift-Ins	Paste the clipboard contents at the current cursor position
Clear	Del	Delete currently selected text without copying to clipboard
Insert Card	F4	Insert new (blank) card at the current position in the stack
Delete Card	Ctrl-F4	Delete the current card from the card stack
Undo Delete	Shift-F4	Insert the last card deleted at the current stack position
OPTIONS		
Search...	F5	Specify a search string and find the first card that contains it
Find Next	F6	Find the next-higher-numbered card containing the specified search text
Find Prev	F7	Find the next-lower-numbered card containing the specified search text
Goto...	F8	Go to a specified card number
Dial...	F9	Dial a phone number
Memory...		Profile memory usage
Settings...		Set PMCARD's default configuration parameters
HELP		
About PMCARD...		Display program information

PMCARD BY MODEM

ies for any commercial purpose is prohibited.

Like all good software, the programs presented in *PC Magazine* are upgraded and improved. The only way to obtain the modified versions is to download them from PC MagNet. Here is a partial list of the programs that have been upgraded to fix minor bugs and system incompatibilities:

ALIAS.COM, Version 1.1
 ANSI.COM, Version 1.3
 BAT2EXEC.COM, Version 1.2
 BESS.COM, Version 1.3
 CARDFILE.COM, Version 1.1
 CHKFRAG.EXE, Version 1.2
 CONFIG.CTL, Version 2.0
 DIRMATCH.COM, Version 2.0
 EMMA.COM, Version 2.1
 EMS40.SYS, Version 1.1
 LITES.COM, Version 1.1
 LOG.COM, Version 1.1
 PANDORA.COM, Version 1.4 (formerly PAN)
 PCMANAGE.EXE, Version 1.1
 PCREMOTE.COM, Version 1.1
 RN.COM, Version 2.0
 SLICE.COM, Version 1.3
 SNIPPER.COM, Version 1.2
 TPFST-AT.COM, Version 1.1
 ZCOPY.COM, Version 1.2

For a complete list of all the programs available from the PC MagNet Utilities Database, download UDCAT.ARC.

A downloadable index to *PC Magazine's* product reviews is also available. PCM.EXE is a self-extracting file that contains the *Computer Library PC Magazine Reviews Index* for January 1988 to June 1990. This easy-to-use database is a subset of the *Computer Library Periodicals Database*, which is available on CD-ROM and on PC MagNet. It requires the search files in PCSRCH.EXE.

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- ◆ #2 386-Based System of 1989—386/25
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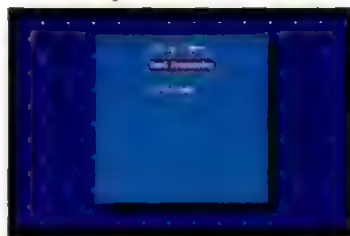
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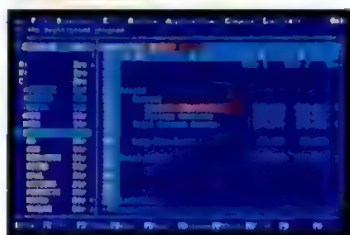
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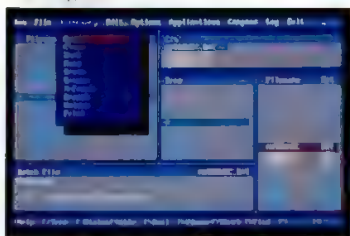
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message parameter from a pointer. The other names that appear in these statements are variables defined by PMCARD. Note the use of Hungarian notation to denote variable types, for example, `ul` for `ULONG` (unsigned long) and `us` for `USHORT` (unsigned short).

One of the beauties of using an MLE is that you don't have to provide the logic for block-related operations such as dragging, cutting, and pasting. The MLE does all the dirty work for you. Once a block of text is selected, a single command—a `WinSendMsg` function with an `MLM_CUT`, `MLM_COPY`, `MLM_PASTE`, or `MLM_CLEAR` message—cuts, copies, pastes, or clears it. Examples can be found in PMCARD's `ClientWndProc` function,

**PMCARD offers a peek
 of what's to come
 when applications are
 ported to OS/2.**

in the processing of `IDM_CUT`, `IDM_COPY`, `IDM_PASTE`, and `IDM_CLEAR` messages.

Powerful? You bet. In fact, the system editor application that comes with OS/2 1.2 uses an MLE for all its text handling. What would be a very complex graphical application is reduced to little more than an operating system object (the MLE) surrounded by an application shell.

MORE TO COME

PMCARD provides a small glimpse of what's to come from software manufacturers working to port their applications to OS/2. It's a wonderful environment, and will get even better when OS/2 2.0—the 386-specific version of OS/2—is released sometime this fall. Current *Windows* 3.0 users can already attest to the power of a protected-mode operating system when used with the 386: DOS applications can now be windowed and multitasked. It won't be long until the 640K barrier is a relic of the past, and text-mode interfaces are as obsolete as yesterday's newspaper. ■

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by
Charles Petzold

Environments

In the last issue, I continued the subject of metafiles under the OS/2 Graphics Programming Interface (GPI) by discussing how the various GPI transforms are stored in metafiles and how GPI uses them when a metafile is played.

This discussion was precipitated by my posing an innocent question: How large is the image in a metafile? Because the image in a metafile is composed of a collection of lines, filled areas, and text, there seems to be no way to get this information without digging into the metafile contents and analyzing the coordinates of all the graphics primitives stored inside.

BOUNDARY DETERMINATION

The problem is solved by a very handy facility of GPI, known as *boundary determination*. Here's how it works:

Let's say you have a handle to a presentation space. By calling the `GpiSetDrawControl` function, you can disable all drawing to the output device associated with this presentation space:

```
GpiSetDrawControl (hps,  
    DCTL_DISPLAY, DCTL_OFF);
```

"Great," you might be saying to yourself. "What good is a graphics system that doesn't draw anything?" Well, a second call to the same function enables boundary determination:

```
GpiSetDrawControl (hps,  
    DCTL_BOUNDARY, DCTL_ON);
```

With boundary determination enabled, GPI will keep track of the maximum rectangle that encompasses all subsequent graphics drawing functions called to the presentation space. The following two function calls restore the presentation space to normal:

```
GpiSetDrawControl (hps,  
    DCTL_DISPLAY, DCTL_ON);  
GpiSetDrawControl (hps,  
    DCTL_BOUNDARY, DCTL_OFF);
```

More on Metafiles: Obtaining the Size of The Image in a Metafile

■ Getting information about the size of the metafile and actually changing its size aren't as hard as you might think.

At this point you can call the following function:

```
GpiQueryBoundaryData (hps, &rcl);
```

The second parameter is a pointer to a rectangle structure of type `RECTL`. The function fills in the four fields of this rectangle structure with the smallest rectangle that encompasses the size of all the graphics drawing functions that were called during the time that boundary determination was enabled.

An example will make this easier to understand. Suppose you make the following function calls while boundary determination is enabled:

```
ptl.x = -25 ;  
ptl.y = 100 ;  
GpiMove (hps, &ptl) ;  
ptl.x = 150 ;  
ptl.y = -50 ;  
GpiLine (hps, &ptl) ;
```

These two function calls draw a line from the point (-25, 100) to the point (150, -50). The four fields of the boundary rectangle that were obtained from `GpiQuery-`

`BoundaryData` will be as follows

```
rcl.xLeft   = -25  
rcl.yBottom = -50  
rcl.xRight  = 150  
rcl.yTop    = 100
```

Strictly speaking, you don't have to use `GpiSetDrawControl` to turn `DCTL_DISPLAY` off before accumulating boundary data, but you're usually obtaining boundary data in preparation for subsequent drawing.

If there are no graphics drawing functions called at the time that boundary determination is enabled, the `RECTL` structure will contain

```
rcl.xLeft   = 0x07FFFFFFF  
rcl.yBottom = 0x07FFFFFFF  
rcl.xRight  = 0xF8000000  
rcl.yTop    = 0xF8000000
```

These values indicate an empty rectangle. The `GpiResetBoundaryData` function resets the boundary rectangle stored internally in GPI to these values. (If all the fields of the structure were 0, that would indicate an image that consisted of just one point.)

Boundary determination works with metafiles. When boundary determination is enabled, you can simply call `GpiPlayMetaFile` to obtain the size of the metafile image.

There's one catch, however: As you've seen in the `METAFILE` program in the September 25, 1990, issue, you can create and play a metafile using a micro presentation space rather than a normal presenta-

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Environments

tion space. Contrary to the Microsoft OS/2 *Programmer's Reference*, you can also normally use boundary determination with a micro presentation space. However, when using boundary determination with a metafile, you must use a normal presentation space. Odd? I agree.

Figure 1 shows a function called `QueryMetaFileBoundaryRect` that will obtain the bounding rectangle for a metafile.

Note the fact that the normal presentation space created in this function is not associated with a device context. It doesn't have to be, because the function is not actually drawing anything. If you call this function for the metafile created in the `METAFILE` program, you'll obtain the following values:

```
rcl.xLeft    = 0
rcl.yBottom  = 0
rcl.xRight   = 100
rcl.yTop     = 150
```

But after the discussion in the last issue about GPI transforms, you may be wondering: What units of measurement are these? Pixels? Millimeters? Inches? Miles?

BOUNDARY RECTANGLE UNITS

In the last issue, I discussed how GPI maps coordinate points passed to GPI functions to the pixels of the output device. A brief review:

The coordinate points passed to GPI functions are called world coordinates. These coordinates are converted by the model transform (set with `GpiSetModelTransformMatrix`) to produce coordinates in model space. Coordinates in model space are converted by the default viewing transform (set with `GpiSetDefaultViewMatrix`) to produce coordinates on the presentation page. Coordinates on the presentation page are converted by the device transform (set with `GpiCreatePS`, `GpiSetPS`, and `GpiSetPageViewport`) to map to pixels on the output device.

The boundary rectangle obtained from `GpiQueryBoundaryData` is in units of the model coordinate space, after any model transforms, but before the default viewing transform and the device transform. (The function shown in Figure 1 sets page units as `PU_ARBITRARY` and the page size to 100 units, but these two items can be any-

thing in this function, because they affect only the device transform, and the device transform doesn't affect the boundary rectangle.)

Not quite by coincidence, the use of model space coordinates is very convenient for using boundary determination with metafiles, because by default `GpiPlayMetaFile` uses only the model transforms stored in the metafile.

GETTING OTHER INFORMATION

In the last issue, we examined how you can use "play options" with `GpiPlayMetaFile` to control how a default viewing transform and a device transform are applied to the image in a metafile. If you play the metafile with no play options, like this:

```
GpiPlayMetaFile (hps, hmf, SL,
                 NULL, NULL, SL, NULL);
```

then GPI uses the default viewing transform and the device transform set for the target presentation space. This code does the same thing:

```
static LONG aoptions [10];
....
aoptions [PMF_RESET] =
    RES_NORESET;
GpiPlayMetaFile (hps, hmf, 1SL,
                 aoptions, NULL, SL, NULL);
```

Alternatively, you can play the metafile

with the reset option:

```
aoptions [PMF_RESET] = RES_RESET;
GpiPlayMetaFile (hps, hmf, 1SL,
                 aoptions, NULL, SL, NULL);
```

In this case, GPI will reset the presentation space using the presentation page size and page units set when the metafile was created. GPI will also calculate a page viewport rectangle based on the resolution of the output device on which the metafile is being played. (The page size, page units, and page viewport together define the device transform.) GPI will then set the default viewing transform to match what was defined when the metafile was created.

If you want to obtain this information without actually playing the metafile, use

```
aoptions [PMF_RESET] =
    RES_RESET;
aoptions [PMF_SUPPRESS] =
    SUP_SUPPRESS;
GpiPlayMetaFile (hps, hmf, 1SL,
                 aoptions, NULL, SL, NULL);
```

The suppress option causes GPI to reset the presentation space but then to stop without actually playing the metafile.

If you play the metafile with the reset option and the suppress option, you can determine how the metafile is setting the device transform and the default viewing transform. But before you can do this you

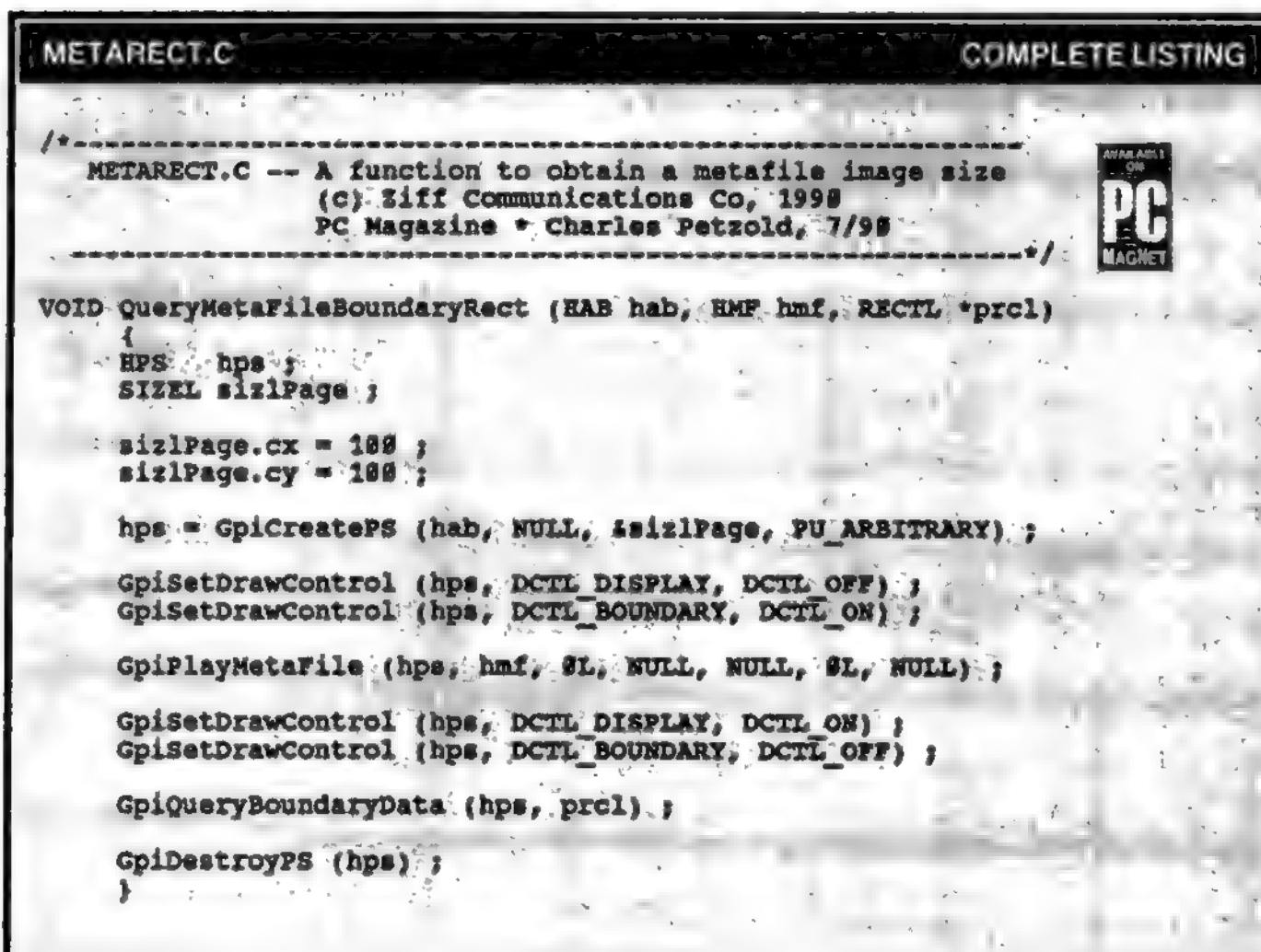
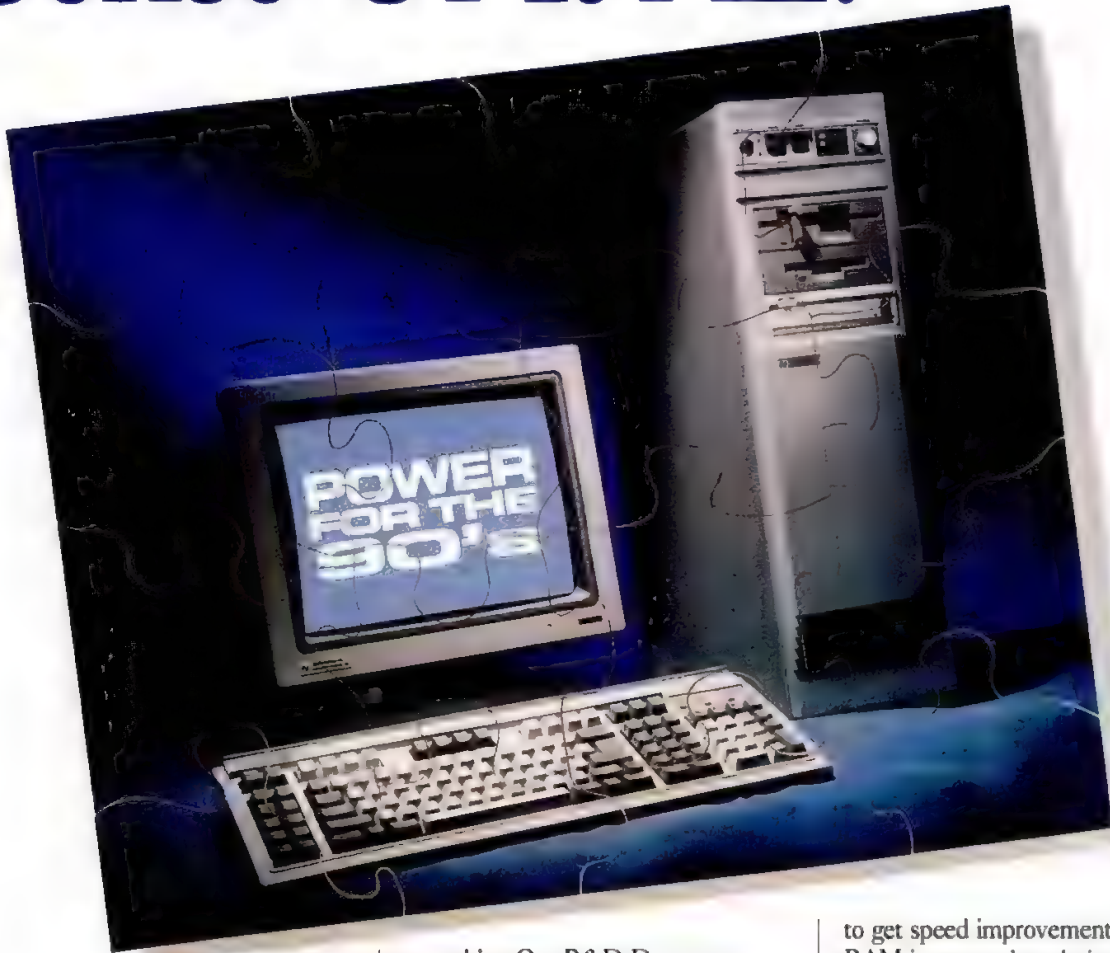


Figure 1: Here's a function you can use to determine the boundary of the image in a metafile.

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need a couple of variables:

```
SIZEL sizlPage ;
ULONG ulPageUnits ;
```

You can obtain the presentation page size and the page units (in terms of one of the identifiers beginning with the PU prefix) using GpiQueryPS:

```
ulPageUnits = PS_UNITS &
GpiQueryPS (hps, &sizlPage) ;
```

You can also obtain the page viewport

rectangle using GpiQueryPageViewport, and the default viewing transform using GpiQueryDefaultViewMatrix. You could then alter these transforms (if desired) and play the metafile without the reset option:

```
alOptions {PMF_RESET} =
RES_NORESET ;
GpiPlayMetaFile (hps, hmf, 16L,
alOptions, NULL, 0L, NULL) ;
```

This technique allows you to play the metafile using the page units defined when the metafile was created but with a different default viewing transform. For example, this allows you to keep the image the same size as it was when it was created but to rotate it.

SCALING THE METAFILE IMAGE

When I first discussed metafiles in the September 25, 1990, installment of Environments, I mentioned that the Display Picture utility that comes with OS/2 1.2 scales metafiles to the size of the client window. By now you should have a good idea how this is accomplished. However, if by some chance you don't, the revised METAFILE.C program shown in Figure 2 will help you figure it out.

Note that METAFILE.C includes the METARECT.C file shown in Figure 1. You can use the METAFILE.MAK and METAFILE.DEF files from the September 25 issue.

In order to make sure that this code is sufficiently generalized, I've altered the

METAFILE.C

COMPLETE LISTING

```
/*-----
METAFILE.C -- Demonstrates GPI metafile creation and playing
(c) Siff Communications Co, 1990
PC Magazine * Charles Petzold, 7/90
-----*/

#define INCL_WIN
#define INCL_GPI
#include <os2.h>
#include <stdio.h>

MRESULT EXPENTRY ClientWndProc (HWND, USHORT, MPARAM, MPARAM) ;
HMF CreateMetaFile (void) ;

HAB hab ;
int main (void)
{
    static CHAR szClientClass[] = "Metafile" ;
    static ULONG flFrameFlags = FCF_TITLEBAR | FCF_SIZEBOX | FCF_MINMAX | FCF_TASKLIST ;
    HMQ hmq ;
    HWND hwndFrame, hwndClient ;
    QMSG qmsg ;

    hab = WinInitialize (0) ;
    hmq = WinCreateMsgQueue (hab, 0) ;
    WinRegisterClass (hab, szClientClass, ClientWndProc, CS_SIZEEDRAW, 0) ;

    hwndFrame = WinCreateStdWindow (HWND_DESKTOP, WS_VISIBLE,
        flFrameFlags, szClientClass, NULL,
        0L, 0, 0, hwndClient) ;

    while (WinGetMsg (hab, &qmsg, NULL, 0, 0))
        WinDispatchMsg (hab, &qmsg) ;

    WinDestroyWindow (hwndFrame) ;
    WinDestroyMsgQueue (hmq) ;
    WinTerminate (hab) ;
    return 0 ;
}

#include "metarect.c"

MRESULT EXPENTRY ClientWndProc (HWND hwnd, USHORT msg, MPARAM mp1, MPARAM mp2)
{
    static HMF hmf ;
    static RECTL rclMetaFile, rclClient ;
    HPS hps ;
    MATRIXLF matlf ;

    switch (msg)
    {
        case WM_CREATE:
            hmf = CreateMetaFile () ;
            QueryMetaFileBoundaryRect (hab, hmf, &rclMetaFile) ;
            return 0 ;

        case WM_SIZE:
            WinQueryWindowRect (hwnd, &rclClient) ;
            return 0 ;

        case WM_PAINT:
            hps = WinBeginPaint (hwnd, NULL, NULL) ;
            GpiErase (hps) ;

            // Translation transform

            matlf.fxM11 = MAKEFIXED (1, 0) ;
            matlf.fxM12 = 0 ;
            matlf.lM13 = 0 ;

            matlf.fxM21 = 0 ;
            matlf.fxM22 = MAKEFIXED (1, 0) ;
            matlf.lM23 = 0 ;

            matlf.lM31 = -rclMetaFile.xLeft ;
            matlf.lM32 = -rclMetaFile.yBottom ;
            matlf.lM33 = 1 ;

            GpiSetDefaultViewMatrix (hps, 0L, &matlf, TRANSFORM_REPLACE) ;

            // Scaling transform

            matlf.fxM11 = 65536L * (rclClient.xRight - 1) /
                (rclMetaFile.xRight - rclMetaFile.xLeft) ;
            matlf.fxM22 = 65536L * (rclClient.yTop - 1) /
                (rclMetaFile.yTop - rclMetaFile.yBottom) ;

            matlf.lM31 = 0 ;
            matlf.lM32 = 0 ;

            GpiSetDefaultViewMatrix (hps, 0L, &matlf, TRANSFORM_ADD) ;

            // Play the metafile using this composite transform

            GpiPlayMetaFile (hps, hmf, 0L, NULL, NULL, 0L, NULL) ;

            WinEndPaint (hps) ;
            return 0 ;

        case WM_DESTROY:
            GpiDeleteMetaFile (hmf) ;
            return 0 ;
    }

    return WinDefWindowProc (hwnd, msg, mp1, mp2) ;
}

HMF CreateMetaFile (void)
{
    static DEVOPENSTRUC dop = { NULL, "DISPLAY" } ;
    static POINTL aptl[] = { -50, -50, -50, 50, 0, 100, 50, 50,
        -50, -50, 50, -50, 50, 50, -50, 50, 50, -50 } ;
    HDC hdcMetafile ;
    HMF hmf ;
    HPS hps ;
    SIZEL sizlPage ;

    // Open a metafile device context

    hdcMetafile = DevOpenDC (hab, OD_METAFILE, "+", 2L,
        (PDEVOPENDATA) &dop, NULL) ;

    // Create a presentation space associated with that DC

    sizlPage.cx = 100 ;
    sizlPage.cy = 100 ;

    hps = GpiCreatePS (hab, hdcMetafile, &sizlPage,
        GPIT_MICRO | GPIA_ASSOC | PU_LOENGLISH) ;

    // Draw a house using eight lines

    GpiMove (hps, aptl) ;
    GpiPolyLine (hps, 8L, aptl + 1) ;

    // Destroy the presentation space

    GpiDestroyPS (hps) ;

    // Close the device context to get the metafile handle

    hmf = DevCloseDC (hdcMetafile) ;

    return hmf ;
}
```

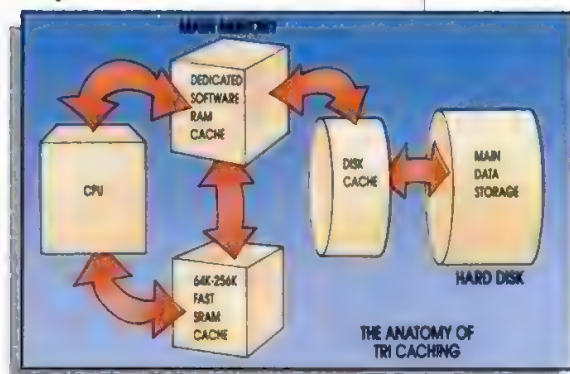
Figure 2: This revised METAFILE.C program scales the metafile to the size of the client window.

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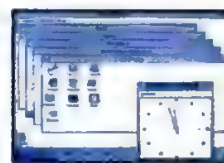
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CreateMetaFile function so that the image contains negative coordinates. This newly created METAFILE program is able to obtain the size of the image contained in the metafile during the WM_CREATE message. For this particular metafile, the four fields of the RECTL structure will have the

following values:

```
rcl.xLeft   = -50  
rcl.yBottom = -50  
rcl.xRight  = 50  
rcl.yTop    = 100
```

The program also saves the size of the client window during the WM_SIZE message.

During the WM_PAINT message,

METAFILE sets the fields of a MATRIXLF structure and calls GpiSetDefaultViewTransform twice. The first call sets the default viewing transform to translate the bottom-left corner of the metafile image to the bottom-left corner of the client window. This requires setting the IM31 and IM32 fields of the MATRIXLF structure to the negative values of the xLeft and yBottom fields of the RECTL structure with the metafile image size. Calling GpiSetDefaultViewMatrix with the TRANSFORM_REPLACE parameter sets this transform in the presentation space.

The image must also be scaled to the size of the client window. The fxM11 and fxM22 fields are set to scaling factors: the horizontal scaling term (fxM11) is the width of the client window divided by the width of the metafile image and fxM22 is the height of the client window divided by the height of the metafile image.

There are two things to note about these calculations: First, the numerator is multiplied by 65,536 to convert to a FIXED number, which is a 32-bit value that consists of a 16-bit integer part and a 16-bit fractional part. Second, the metafile rectangle defines the edges of the image while the xRight and yTop fields of the client window rectangle are actually one pixel beyond the client window. For this reason, 1 is subtracted from these two fields.

The second transform is set with GpiSetDefaultViewMatrix using the TRANSFORM_ADD parameter. The word ADD is actually a misnomer here: What really happens is that GPI multiplies the first matrix by the second to create a composite matrix transform that includes both translation and scaling.

GpiPlayMetaFile has no play options, so GPI ignores the page size, page units, and default viewing matrix encoded in the metafile. Instead, GPI uses the device transform and default viewing matrix set for the target presentation space. This causes the image to fill the client window.

RESETTING THE PRESENTATION SPACE

As you've probably realized by now, working with metafiles requires a background in several other aspects of GPI. It also requires some experimentation, because the existing documentation doesn't spell out the details as well as it could. As a demonstration, let's examine how metafiles handle graphics attributes.

When you use the reset option to play the metafile, GPI extracts the presentation page units and page size stored in the meta-

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file and effectively calls the following function:

```
GpiSetPS (hps, &szl, lPageUnits);
```

where `szl` is a `SIZEL` structure that contains the page size and `lPageUnits` is one of the identifiers beginning with the `PU` prefix (such as `PU_LOENGLISH`). After this, GPI will set the default viewing matrix for the presentation space and then play the contents of the metafile.

The `GpiSetPS` function has very severe consequences for the presentation space. Changing the page size and page units is such a drastic change that GPI resets everything in the presentation space to default values—just as if the presentation space had been newly created. In short (as the documentation states), calling `GpiSetPS` also causes GPI to reset the presentation space in a way that is equivalent to the following function call:

```
GpiResetPS (hps, GRES_ALL) ;
```

When I discussed above how you can determine the boundary of the image in the metafile, and also how you can determine the presentation page units, page size, and default viewing matrix stored in the metafile, you may have considered combining these two jobs into one call to `GpiPlayMetaFile`. Don't do it! Calling `GpiPlayMetaFile` with the reset option (which is necessary to determine the page units, page size, and default viewing matrix) turns boundary determination off. That's one of the repercussions of resetting the presentation space.

The `GpiResetPS` function can accept three different parameters: `GRES_ATTRS`, `GRES_SEGMENTS`, and `GRES_ALL`. These parameters have a progressively more severe impact on the presentation space, as documented in the *Microsoft OS/2 Programmer's Reference*.

METAFILES AND ATTRIBUTES

The `METAFILE` program that is shown here displays the image in the default foreground color, which is the "window text" color you set in the Presentation Manager Control Panel. What if you wanted to draw the image in a different color, such as red?

The easy way to do this is to set the col-

or to red when creating the metafile. In `METAFILE.C`, you'd insert the statement

```
GpiSetColor (hps, CLR_RED) ;
```

right after the `GpiCreatePS` call in the `CreateMetaFile` function. GPI would then set the color to red when it played the metafile.

You should be aware that all graphics attributes (such as color) set within a metafile remain in effect for the target presentation space after the metafile is played. Thus, if you added some code to draw something else after the `GpiPlayMetaFile` call in `METAFILE.C`, those graphics would also appear in red. So, after playing a metafile, it would probably be wise to restore all attributes to their default values.

You should note that all graphics attributes set within a metafile remain in effect for the target presentation space after the metafile is played.

You can do this with a call to `GpiResetPS`.

Now let's tackle a more difficult problem: What if there is no `GpiSetColor` call in the metafile itself, but you still want to draw the image in red?

You might think (as I did) that this is simply a matter of inserting the function call:

```
GpiSetColor (hps, CLR_RED) ;
```

right before the `GpiPlayMetaFile` call. I realized that this wouldn't work if `GpiPlayMetaFile` is called with the reset option, because all attributes would be set to their default values. But you should try inserting a call to `GpiSetColor` right before the `GpiPlayMetaFile` call in `METAFILE.C`. Even without the reset option, it still doesn't work!

Apparently—and this is one aspect of metafiles that is not adequately documented—GPI still resets attributes to de-

fault values, even when you call `GpiPlayMetaFile` without the reset option. My guess is that GPI makes a call to:

```
GpiResetPS (hps, GRES_ATTRS) ;
```

which is the least severe form of the `GpiResetPS` function. (GPI certainly doesn't use the `GRES_SEGMENTS` parameter in this case, because that would also reset the default viewing transform. We know from the revised `METAFILE` program shown here that the default viewing transform is not being reset when the metafile is played without the reset option.)

So you're stuck, right? There's no way you can play the metafile using a different color, right? Well . . . wrong. Beginning in OS/2 1.2, there is a way.

CHANGING DEFAULT ATTRIBUTES

As we've seen, you can change the current color to red by calling

```
GpiSetColor (hps, CLR_RED) ;
```

This changes the color for all five GPI graphics primitives—lines, areas, text, markers, and images. If you want to change the color to red for lines only, you can use the `GpiSetAttrs` function. You first define a structure of type `LINEBUNDLE`:

```
LINEBUNDLE lband ;
```

You then set the `lColor` field of this structure to `CLR_RED`:

```
lband.lColor = CLR_RED ;
```

and then call `GpiSetAttrs`:

```
GpiSetAttrs (hps, PRIM_LINE, LBB_COLOR, &lband) ;
```

The third parameter indicates the attribute you want to change.

To change the color to its default value, you can call either

```
GpiSetColor (hps, CLR_DEFAULT) ;
```

to affect all GPI graphics primitives, or

```
GpiSetAttrs (hps, PRIM_LINE, LBB_COLOR, LBB_COLOR, &lband) ;
```

to affect lines only. Notice that the third parameter is set to `LBB_COLOR` to indicate that you want to change the color attribute, and the fourth parameter is also set to

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Speed, disk-intensive applications	(100)	Excellent
Software compatibility	(150)	Excellent
Hardware compatibility	(125)	Excellent
Expandability	(75)	Excellent
File Server Performance		
Speed, office applications	(300)	Satisfactory
Speed, transaction	(125)	Good
Speed, burst transfer	(25)	Excellent
Expandability	(100)	Excellent
Documentation	(50)	Excellent
Setup	(100)	Good
Serviceability		
System design	(60)	Good
Support policies	(50)	Excellent
Technical support	(75)	Excellent
Workstation Value	(125)	Excellent
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Environments

LBB_COLOR to indicate that you want to set that attribute to its default value.

You could also call

```
GpiResetPS (hps, GRES_ATTRS) ;
```

and all attributes—including color—are set to default values.

In OS/2 1.1, setting the color to the default value was equivalent to setting the color to CLR_NEUTRAL, which refers to the "text color" you set with the Presentation Manager Control Panel.

Beginning in OS/2 1.2, you have control over the default attributes through the GpiSetDefAttrs function. This function is quite similar to GpiSetAttrs. To set the default line-color attribute to red requires the following code:

```
LINEBUNDLE lbnd ;
....
lbnd.lColor = CLR_RED ;
GpiSetDefAttrs (hps, PRIM_LINE,
LBB_COLOR, &lbnd) ;
```

Now when you call

```
GpiSetColor (hps, CLR_DEFAULT) ;
```

or

```
GpiSetAttrs (hps, PRIM_LINE,
LBB_COLOR, LBB_COLOR, &lbnd) ;
```

or

```
GpiResetPS (hps, GRES_ATTRS) ;
```

the line-color attribute is set to CLR_RED rather than CLR_NEUTRAL. Calling

```
GpiResetPS (hps, GRES_ALL) ;
```

restores everything to normal. The default color is again CLR_NEUTRAL.

So, that's the answer! If you want to draw the image in METAFILE.C in red, insert the following code before the GpiPlayMetaFile call

```
{
LINEBUNDLE lbnd ;
lbnd.lColor = CLR_RED ;
GpiSetDefAttrs (hps, PRIM_LINE,
LBB_COLOR, &lbnd) ;
}
```

But, if you play the metafile with the reset option, this won't work. Instead, you'd want to play the metafile with the reset option *and* the suppress option, then set the default attribute with the GpiSetDefAttrs function, and then continue playing the metafile with another call to GpiPlayMetaFile without the reset option.

DEPARTMENT OF CLARIFICATION

In the August 1990 column, I recommended using the new profile functions in OS/2 1.2, those beginning with the Prf prefix (such as PrfSetProfileData) because their counterparts with the Win prefix (such as WinSetProfileData) would not be supported under OS/2 2.0. I stated that these two sets of functions were identical. I was wrong, as I found out when I took my own

Beginning with OS/2 1.2, you have control over the default attributes through the GpiSetDefAttrs function, which is actually quite similar to GpiSetAttrs.

advice and began using the Prf functions in my own code.

First, the first parameter to the Win profile data functions is the thread's anchor block handle. In the Prf functions, the first parameter can be either HINL_USERPROFILE or HINL_SYSTEMPROFILE, indicating whether you want the profile data to be stored in OS2.INI or OS2SYS.INI. The PrfQuery functions also accept a parameter of HINL_PROFILE to search in both profile files.

Second, some of the functions have slightly different parameter definitions and return values. In particular, WinQueryProfileSize returns 0 if the function is successful while PrfQueryProfileSize returns 1 if the function is successful. I don't have to tell you that this difference caused me some extreme debugging headaches until I finally figured it out! ■

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Bank Account:		Bank Name		Address		Checking		Savings			
Bank Loan Reference:		VISA		MasterCard		Payment		Balance			
Bank Card Reference:		VISA		MasterCard							
Other Credit Reference:		Account No.		Expires							
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Date of Residence: Mo Yr		Monthly Income: Gross \$		Net \$							
Employer:		Date of Employment: Mo Yr		Position:		Monthly Income: Gross \$		Net \$			
Employer's Address: Street		City		State		Business Phone: ()					
d. Self-Employed Information											
Complete this section only if you are self-employed.											
Business Name		Proprietorship		Corporation		Partnership					
Business Address		Business Telephone: ()									
Description of Business		Your Position		In Business Since							
Your annual income from business		Business annual income (gross)		(net)							
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by
Ray Duncan

Power Programming

A Prescription for The Operating System of the Future

The evolution of IBM-compatible personal computer hardware over the last nine years has been nothing short of awesome. During this time we've moved from 4.77-MHz 8088-based machines with an 8-bit I/O bus and 64K of RAM on the motherboard to 25-MHz 80486-based machines with cache and a numeric coprocessor built right into the CPU chip, a 32-bit I/O bus, and 8MB or more of RAM on the motherboard.

We've gone from 160K 5.25-inch floppy disks to 3.5-inch 1.44MB microdisks along with fixed disk arrays supporting gigabytes of fast storage. We've gone from 640-by-200 2-color graphics to 640-by-480 16-color graphics as the baseline—and in the CAD, image processing, graphics design, and desktop publishing worlds, graphics adapters with much higher resolution and 256 or more colors are common.

However, it's sad to say that the prevalent operating system on IBM-compatible personal computers—DOS—has not kept pace with this forward march of technology. Indeed, its basic design and user interface has hardly changed since 1983, when DOS 2.0 was introduced with the IBM PC-XT. There have been minor cosmetic improvements since then, as well as scattered technological enhancements such as support for larger fixed disk partitions and networks. It seems safe to say that if a PC-XT DOS 2.0 user sat down at a Compaq Deskpro 486 running DOS 4.0, he probably wouldn't notice any differences except for an enormous increase in speed—even if you asked him to make system-level adjustments in areas ordinarily reserved for the power user, such as CONFIG.SYS or AUTOEXEC.BAT.

The backwardness of DOS in 1990 presents us with one of life's more interesting contradictions. Owners of Microsoft's other products—such as *Word*, *Excel*, or any of the programming tools—can attest to Microsoft's frequent, clockworklike release of reasonably priced upgrades that deliver significantly improved function-

■ With an installed base of millions, DOS needs to be upgraded to match current levels of technology and expectations.

ality, ease of use, and documentation. Unlike some large software houses we could name, Microsoft's competitive strategy has been to present its rivals with a constantly moving target, rather than attempting to preserve its market share through courtroom shenanigans. Why, then, has Microsoft allowed DOS, one of the most incredible cash cows of all time, to languish?

I'm not privy to the inner strategic councils in Redmond, but I think I can make some pretty accurate guesses about why DOS remains today much as it was in 1983. First, by 1985 or thereabouts, Microsoft was already deploying massive resources toward development of the protected-mode operating system that would eventually become OS/2—in effect, betting that OS/2 would displace DOS in a relatively short time. Second, Microsoft became entangled in the Joint Development Agreement with IBM, and bartered away its complete control over DOS's architecture and product life cycle. Third, Microsoft did not foresee the phenomenal impact that DOS Extenders would have in prolonging the useful life of DOS. DOS Extenders have made it easy for software developers to sell true protected-mode ap-

plications—which can fully exploit the features and extended memory of the 80286, 80386, and 80486 processors—on ordinary DOS media through normal DOS distribution channels to any DOS user who owns a PC that is based on an 80286 or later CPU.

In 1989, approximately 11 million new copies of DOS were shipped, and the installed base of DOS was estimated at 45 million. This means that, unless there is an almost unimaginably severe recession, or an almost equally unimaginable drastic shift in end-user attitudes toward Unix and OS/2, the DOS installed base should be approaching 100 million by the end of 1995. Any saturation of the U.S. market should be more than offset by the incredible opportunities it has for growth in Europe and the Far East. That's a lot of new DOS users, and it means that it's not too late to make some radical improvements in this venerable operating system—if Microsoft is able to throw off its OS/2 blinders and give DOS the respect and attention that it deserves. Let's take a quick look at the areas in which DOS could use some serious surgery.

INSTALLATION AND SETUP

DOS's current facilities for installation provide some of the most striking evidence of the sad neglect of DOS over the last five years. While installation programs for Microsoft's other products have become more and more flexible, foolproof, and even entertaining, installation of DOS still depends on the user's understanding of FDISK, FORMAT, SYS, and COPY, or alternatively, on that appalling miscarriage

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of software design, the **SELECT** command. DOS users certainly deserve better treatment than this. Just because they proved they can struggle along with such primitive installation aids for the last nine years doesn't mean that the situation should be allowed to continue. What DOS needs and warrants is an intelligent and forgiving installation program akin to the **SETUP** of *Microsoft Windows 3.0*. The program should run in a visual, full-screen, interactive mode with pull-down menus and all the other modern conveniences, support a mouse, abide by the CUA guidelines, and include detailed, context-sensitive, on-line help.

Naturally, the new installation program needs to be able to emplace a copy of DOS on a completely clean fixed disk, offering the user all the possible formatting and partitioning options while at the same time making recommendations that will lead to the most efficient use of disk space. The program should also have the capability to analyze the machine's installed memory and other assets and assist the user in making intelligent choices about which device drivers to load, allocating memory for disk caches or RAM disks, and so forth. The gory details regarding the contents of the **CONFIG.SYS** and **AUTOEXEC.BAT** files should be hidden from the user; instead, the user should be able to make non-cryptic choices from menus that will automatically result in the generation of the correct **CONFIG.SYS** and **AUTOEXEC.BAT** directives. The setup program for Digital Research's *DR DOS*, Version 5, sets a good example here.

Even more importantly, the new installation program needs to be able to safely and correctly install a new version of DOS on top of any existing OEM version of DOS, searching out and replacing all instances of the various DOS utility programs that are present anywhere on the disk. Preexisting **CONFIG.SYS** or **AUTOEXEC.BAT** files should be carefully updated with any additional directives required by the new DOS version, rather than being arbitrarily overwritten; clear-text explanations of the differences between the "old" and "new" versions of the two files should be displayed for the user's inspection and approval before final changes are made. The installation program should also have the capability of

changing the existing fixed disk partitioning "in place," using its knowledge of the disk structure to move files and rebuild directories as necessary.

Finally, the new installation program should copy itself into the DOS utilities directory so that it can be invoked repeatedly at the user's discretion—to change system parameters, reallocate memory, or install additional device drivers. And if a crash-prone DOS configuration should be created, despite the best intentions of the user and the determined defenses of the installation program, there should always be an escape hatch of last resort: booting DOS

**DOS's installation
program needs to
safely and correctly
install a new version of
DOS on top of any
existing OEM version,
searching out and
replacing all instances
of the various DOS
utility programs.**

with a specific, user-definable key combination should signal DOS to ignore **CONFIG.SYS** and **AUTOEXEC.BAT** altogether.

THE USER INTERFACE

The user interface in DOS, Version 4, consists of two somewhat independent modules. The first module is **COMMAND.COM**, an archaic command line interpreter whose repertoire of directives dates back to the very first release of DOS. In many ways, **COMMAND.COM** is a direct descendant of **CP/M**, Digital Research's 1970s-vintage operating system for 8080- and Z-80-based microcomputers. **CP/M**'s command set was, in turn, modeled by **CP/M**'s author Gary Kildall after DEC's operating systems for the PDP-8 and PDP-11.

I suppose that **COMMAND.COM**

must be retained in order to keep the DOS hackers happy, but there's a great deal that can be done to make it more tolerable. Popular **COMMAND.COM** enhancers or replacements such as *CED*, *4DOS*, and *Command Plus* maintain backward compatibility with **COMMAND.COM** but add many useful capabilities such as command-line history and recall, command completion, macros, synonyms, hooks for resident extensions, a complete batch programming language, sorted directories, a safer but more powerful **ERASE** command, and regular expression handling. All these features, as well as on-line help and syntax examples for every DOS command, should be integrated into DOS's own **COMMAND.COM** to atone for its stagnation over the last decade.

The second user interface module in the current versions of DOS is the so-called DOS Shell, which apparently was perpetrated at IBM Boca Raton as part of the ill-fated DOS 4 project. The DOS Shell in its present form has little to recommend it; compared with popular third-party shells such as *PC Tools* or *Norton Command*, it's not very attractive, not very powerful, and not very easy to use. Furthermore, the DOS Shell is not a true graphical user interface (GUI)—it's only a pale simulation of one for users who don't know any better. This leaves DOS at a marked disadvantage compared with the other three operating systems that are widely used on microcomputers—Unix, Macintosh's System 6 and 7, and OS/2—all of which are shipped with a GUI as a standard element of the system.

The best solution to the deficits of the DOS Shell, in my humble opinion, is to discard the nasty little rascal without wasting any more time on it. Microsoft already has a critically acclaimed GUI for DOS—*Microsoft Windows 3.0*—at its fingertips, and this GUI should simply be bundled into DOS in place of the DOS Shell as a standard part of the package. This would drastically simplify system installation and management for users, and would also help to rapidly expand the market for *Windows* applications, which is where Microsoft stands to make its real money.

DOS FUNCTIONALITY

The two most important gaps in DOS functionality are its primitive video and serial communications drivers. Since the earliest days of DOS, applications have been forced to go directly to the hardware controllers for these two devices in order to get

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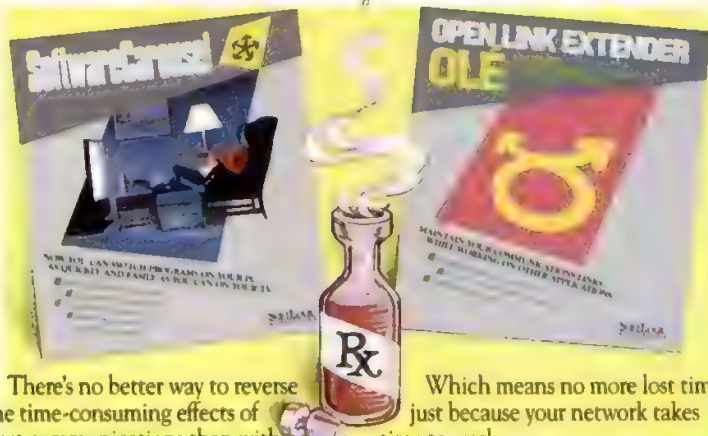
adequate performance. Ironically, Microsoft now claims that it's not worthwhile to improve DOS's video and communications facilities because no application would use them anyway.

But I think Microsoft is wrong. Very few programmers actually *prefer* to delve into this sort of bit-banging, hardware-dependent programming. If DOS's display and communications services were properly spiffed up (equivalent, say, to the video and serial communications subsystems in OS/2 1.0), most programmers would migrate their applications toward well-behaved use of these operating system services over the next few product releases. In the end, programmers' jobs would be simplified, application compatibility would be vastly improved, and multitasking DOS applications would become much less of a hassle.

Given the enormous range of machines that DOS runs on—from 8088-based laptops to 80486-based network servers—the next most important thing that should be done to improve DOS is to make it adapt itself to the capabilities of the host processor. As it happens, *Windows 3.0* sets a sterling example in this area. *Windows 3.0* is capable of running in three modes: real mode on 8086/88-based PCs, standard mode (which allows use of extended memory) on 80286-based PCs, and enhanced mode (which includes virtual memory and preemptive multitasking) on 80386- or 80486-based PCs. However, if DOS were to follow *Windows'* lead, it wouldn't make much sense for the installation program to copy one monster version of DOS onto the hard disk that contained parallel sequences of machine code for each of the possible CPUs. Instead, the installation program should sense the CPU type and select the appropriate modules from all the possible variants that would be present on the DOS distribution disks.

At first glance, it's hard to see what could be done to further optimize DOS for the lowest-level, 8086/88-based PCs. DOS's speed on 8086/88 machines has never been a problem, because it was originally written for those CPUs and much of its kernel is coded in carefully hand-tuned 8086/88 assembly language. Similarly, DOS doesn't squander disk space; it's still quite practical to boot and run DOS on a floppy-disk-only system. The problems

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Power Programming

that arise with DOS on 8086/88-based PCs are mainly related to its appetite for RAM. As DOS has evolved, it has required an increasingly large percentage of the precious memory below the 640K boundary—a trend that peaked out (luckily) in DOS 4.0, which had such a pudgy kernel that some applications refused to run at all. But a little creative thinking yields at least four ways in which DOS's demand for conventional memory could be further mitigated on 8086/88-based PCs.

First, when expanded memory is available, most of the DOS kernel and COMMAND.COM could be loaded into EMS and executed from the EMS page frame—the necessary restructuring of DOS to make this possible has already been accomplished in ROMable DOS 3.22. DOS's internal tables and buffers should also be moved to EMS automatically whenever expanded memory is available. Second, DOS should allow the user to create multiple named configurations, each with a different CONFIG.SYS and AUTOEXEC.BAT, and select one of these configurations from a menu at boot time. For example, a user might have one configuration that loads a minimum set of device drivers for use with a particularly memory-hungry application, while another configuration would load a complete set of network device drivers, and a third configuration would create a large RAM disk to speed up compilations. DR DOS 5.0's ability to prompt the user during interpretation of CONFIG.SYS and bypass certain directives according to the user's response is a step in the right direction, but doesn't go nearly far enough.

Third, 8086/88-based DOS should be "subsettable"—for instance, if a user knows that he will never run any programs that use the obsolete FCB file functions, he should be able to specify this at installation, so that a smaller DOS kernel can be loaded. An alternative route would be to put each class of DOS functions into dynamic link libraries and implement a dynamic link loader in the DOS kernel. Of course, if *Windows* were integrated into DOS as I've suggested, these sorts of capabilities would come "free." Fourth, and this is perhaps a much longer-range objective, the DOS kernel's interface to device drivers should be extended so that drivers can be dynamically loaded and unloaded

without the hassle of resetting the system. It would also be nice if device drivers could be executed from expanded memory, although this process would require much more elaborate facilities for interrupt handling than DOS currently supports. Again, if the *Windows* dynamic link library and virtual memory facilities were consolidated into the DOS kernel, these features could be added to DOS in a fairly straightforward manner.

When we look at 80286-based PCs, we find that Microsoft has already done a reasonably good job of enhancing DOS to take advantage of this CPU. On 80286s, nearly all of the DOS 5.0 kernel can be loaded into the high-memory area (HMA) at segment FFFFh, reducing DOS's over-

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head in conventional memory below the 640K boundary to something less than 20K. If this capability were to be combined with the dynamic linking, efficient use of expanded memory, and other new features already mentioned as desirable for the base (8086/88) version of DOS, we'd have a pretty decent 80286 operating system. But there is one more thing that needs to be mentioned. Microsoft has been instrumental in the creation and standardization of the DOS Protected Mode Interface (DPMI), which provides extended memory allocation, mode switching, and interrupt management services for protected-mode DOS Extender-based application programs. Microsoft needs to go the final mile and incorporate the DPMI into DOS

as a standard set of DOS services, whenever DOS is running on a PC based on an 80286 or later processor.

But it is really the 80386 and 80486 CPUs that hold the key to DOS's future. Microsoft already has the 80386/486 software technology in hand to transform DOS into a killer operating system, but has failed to deliver this technology to end users because of its preoccupation with OS/2. In *Windows 3*, Microsoft displayed the capability to fully exploit the 80386 instruction set, preemptively multitask standard DOS applications in separate Virtual-86 machines, supply applications with emulated EMS 4.0 memory, and provide demand-paged virtual memory on a DOS platform. And in OS/2 2.0, Microsoft demonstrated the ability to run DOS applications and even ill-behaved TSRs in Virtual-86 machines under the control of an operating system that lives entirely outside the traditional DOS 1MB address space. All these features, along with the DPMI and other capabilities already discussed for the 8086/88 and 80286 machines should be subsumed into the DOS kernel when it's running on an 80386 or 80486.

Imagine the implications of a DOS that took full advantage of the 80386 and 80486 processors! A DOS kernel that was recoded in native 80386 assembly language would be incredibly fast, because it could exploit the 80386/486's 32-bit registers, unique instructions, and addressing modes. And the lid would be off as far as adding features; since the 80386/486-specific DOS kernel could execute in extended memory, it could grow as large as the designers felt necessary. For example, the 100K or so of RAM that would be required for DOS to support the OS/2 High Performance File System (HPFS) would be no problem at all. It would even be perfectly practical for all DOS commands—including CHKDSK and XCOPY—to be intrinsic; they wouldn't need to be read into memory from disk each time they were used, so their invocation would be instantaneous.

DOCUMENT THE UNDOCUMENTED

Along with bringing the functionality of DOS up to 1990's standards, Microsoft needs to expose and document the functionality that is already present. For example, Microsoft has always been extremely reluctant to document the DOS functions and internal flags that are crucial to the proper operation of terminate-and-stay-

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Power Programming

resident (TSR) programs, stating that these functions must remain undocumented because they might change in future versions of DOS. The truth is, of course, that so many important commercial products (including several of Microsoft's) depend on these undocumented functions that they can never be allowed to change. Therefore, the mystery functions and flags might as well be documented and supported like the remainder of the DOS programming interface.

Another aspect of DOS programming that has traditionally been steeped in mystery is the so-called redirector interface; only the largest network vendors have been allowed access to this information. The redirector interface is the back door to the DOS file system and is roughly equivalent to the installable file system interface in OS/2. It allows modules that support non-FAT storage volumes, such as CD-ROMs or network drives, to be spliced into DOS in such a way that applications can access files on those volumes in a "transparent" manner. Exposing the redirector interface would help to stabilize it (at present, each new version of DOS typically breaks everyone's network drivers) and would open the door to rapid evolution and innovation in DOS file systems.

SUPPORT AND UPGRADES

Up until this year, Microsoft's position on end-user support and updates for DOS was adamant and unyielding: Microsoft didn't support nobody nohow. Microsoft's policy was originally based on its perception of DOS as a non-retail product. During the earliest days of DOS, Microsoft never sold DOS directly to end-users; instead, it licensed MS-DOS Binary Adaptation Kits (BAKs) to manufacturers of personal computers—the so-called Original Equipment Manufacturers (OEMs). In theory, the OEMs assumed all responsibility for customizing MS-DOS for their equipment, repackaging it with appropriate documentation, selling it to their customers along with the machines, providing end-user support, and paying royalties on a per-copy basis back to Microsoft.

It's true that a few OEMs—notably Compaq, Zenith, and Toshiba—actually did make an effort to optimize DOS for their hardware. But most didn't invest any more effort in the operating system than to

change the DOS sign-on message slightly to include their own company name, slap their logo on the basic DOS documentation, and pocket the difference between the list price and Microsoft's royalty plus printing and disk duplication costs. Understandably, users found it a bit difficult to comprehend how Microsoft could claim that it was unable to answer questions about DOS. Microsoft aggravated this credibility gap by manufacturing a "generic" version of DOS in a gray box that turned up in the hundreds of copies at fly-by-night computer dealers, swap meets, and flea markets.

In 1990, as part of its reawakening to the continued importance of DOS, Microsoft made a startling U-turn on its policies regarding end-user support for DOS. A 900 number wired to a building full of

My own prejudice is
that DOS should be
converted into a
single, uniform retail
product, similar to the
way *Windows* is
marketed today.

technical support personnel was established, and in addition Microsoft began to accept direct questions about any OEM version of DOS. Considering the size of the DOS installed base, this was a courageous move on Microsoft's part, and I applaud its decision to finally accept proper responsibility for supporting its own product. There are also rumors that the DOS 5.0 upgrade/update will be made available directly from Microsoft to end-users by phone, mail order, or through normal software distribution channels. If this should truly come to pass, it will be additional potent evidence that Microsoft has undergone a fundamental shift in its attitude toward support of DOS.

But there is still much to be done. Over the long run, the proliferation of MS-DOS into multiple, slightly dissimilar OEM versions has been a disservice to its users. It has prevented many users from obtaining

proper technical support or timely updates, forced users to purchase new copies of DOS unnecessarily when one machine was replaced by another, and it has insulated Microsoft from vital user feedback about its most widely used product. To my mind, the best way to solve these ongoing problems is to eliminate the middlemen, at least to the extent that this is feasible with systems software.

My own prejudice is that DOS should be converted into a single, uniform retail product, similar to the way *Windows* is marketed today. The basic product would rely only on the existence of an IBM-compatible ROM BIOS and would not perform any direct hardware accesses. All customizations for a particular OEM's hardware would be handled through the OEM's distribution of special "device support diskettes." These diskettes would contain OEM-specific device drivers, utility programs, and setup information that would be recognized and merged into the DOS system by the installation program. If set up in this fashion, the integrity of DOS as a stable, predictable platform for applications would be guaranteed, while the ability of the OEM to "add value" to DOS would also be preserved.

THE SUCCESSOR TO DOS

Nearly all of the elements of a worthy successor to DOS have already been demonstrated in the beta test version of MS-DOS 5.0, other Microsoft products such as OS/2 2.0 and *Windows* 3.0, the DOS clones such as Digital Research's DR DOS, Version 5, or third-party DOS tools and utilities. Creation of such a super-DOS wouldn't require that Microsoft break any new technological ground. But it would require that Microsoft reconcile itself to the marketplace's resistance to the size and complexity of OS/2, and commit itself wholeheartedly to making DOS everything that it can be—regardless of the impact this might have on Microsoft's Joint Development Agreement with IBM or on OS/2 sales. Can Microsoft summon up the intestinal fortitude to make such a decision? Perhaps we'll find out in DOS, Version 6!

THE IN-BOX

Please send your questions, comments, and suggestions to me at any of the following e-mail addresses:

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by
William S. Hall

Windows

MARKED WINDOWS PROGRAMS

What's the difference between a so-called marked *Windows* program and one that has been designed specifically for *Windows* 3.0?

Ewa Tarczynska
Pittsburgh, Pennsylvania



A marked *Windows* program is a *Windows* 2.x program that has been passed through the MARK utility. MARK does little more than set 2 bits. One, the memory management bit, simply eliminates a warning dialog box that comes up when you run a *Windows* 2.x application under *Windows* 3.0. The other enables the use of proportional fonts in resources such as dialog boxes, menus, and so forth. Of course, the developer should take the time to verify that an application will function correctly under *Windows* 3.0 before running it through the MARK utility. If he does, once the bits are set, a MARKed application will run correctly in *Windows* 2.x and in all three modes of *Windows* 3.0.

Certain *Windows* 3.0 features may be missing, though, since they depend on *Windows* 3.0's API. The most obvious lack may be the on-line help system (although such programs as *Excel* and *Word for Windows*, having developed their own help systems, provide a similar facility).

By contrast, a true 3.0 application has been linked with libraries from the 3.0 development kit. Such a program will not run in *Windows* 2.x, but on the other hand, the developer has access to the richer functionality of 3.0, such as the Color Palette Manager, Device Independent Bitmaps, the Multiple Document Interface, and so on.

For quite some time, you can expect most vendors to supply either marked 2.x programs or two versions. When you opened your *Windows* box, did you happen to look at all of the extra pieces of paper you received? One of them is an Application Reference List showing software vendors with new or updated applications designed specifically for 3.0. In particular,

■ **MARKED WINDOWS PROGRAMS:** The MARK utility indicates *Windows* 2.x applications that will work in 3.0.

■ **MANAGING FILES:** Organize your data files with *Windows* 3.0's Program Manager.

■ **WIN.INI LAMENT:** It's not easy to find out how to set up this important file.

■ **WHEN TO SHARE:** Don't SHARE a *Windows* installation.

you can find the compatible version numbers, shipping dates, and telephone numbers where you can obtain update information. And if you managed to throw away the list in the excitement of opening your *Windows* package, you can always call the Microsoft *Windows* Hotline at (800) 323-3577.

MANAGING FILES

You don't have to think of a program group as holding only executable files. With a bit of ingenuity, you can link a data file with the program that created it. Here's the idea:

I use *Windows* 3.0's Program Manager to organize my *Ami Professional* documents into handy groups. By using the File New command, I first create my group, *Ami Pro Docs*. Then I create program items such as MEMO, NOTES, FORM LETTER, and so on. To get *Ami Pro* to start up with the desired document, the Properties must be set as follows:

```
C:\AMIPRO\AMIPRO.EXE  
C:\AMIPRO\DIR\FILENAME.EXT
```

where *DIR* is the name of the directory

holding *FILENAME.EXT*, the data file you want to display. Of course, for each application, you'd enter the application's path and its name. If the file you want to open is in the same directory as the application, all you need to do is enter a space and then the filename after the application's executable filename, for example,

```
C:\AMIPRO\AMIPRO.EXE FILENAME.EXT
```

It's only when the data file is in a separate directory that the entire path must be entered.

I've created several such program groups (ADDRESSES, PERSONAL LETTERS, BUSINESS, and so on) and have found the Program Manager to be an invaluable tool.

Jim Morris
Arlington, Virginia



This is quite a nice idea. Mr. Morris has found a way to make the Program Manager act as a simplified object-oriented desktop. On such a desktop, each object can have both data and an action associated with it. In this case, a word processor file is associated with a program; selecting the file executes the program and loads that data file. Of course, on an object desktop, such as Hewlett-Packard's *New Wave* (which rides, incidentally, on top of *Windows*), the objects and their actions can be quite general and their integration with each other much more seamless.

Morris also shows how you can group a collection of related files with their corresponding actions. And the files are not necessarily confined to a single directory but may be located anywhere on the machine.

Naturally I had to try out the idea, and along the way I made a couple of interesting discoveries. I tested this idea using my word processor, *Write*, as the basic program, and a collection of .WRI files became the objects. First I followed the syntax suggested above, substituting my word

Windows

processor in place of AMIPRO:

WRITE.EXE FILENAME

The result was a program item with the WRITE icon. Then I tried omitting the executable name, leaving only the data filename on the command line. (Because WIN.INI knows that filenames with the .WRI extension imply using WRITE.EXE, it's enough to have the data file alone in the command line.) Then I repeatedly clicked on the View Next button until I found an icon I liked—I selected something that looks like a text file.

Figure 1 shows my program group and the properties for two of the items there. You can see how the selection of the command line influenced the choice of icon.

By the way, you can select icons from any file that has them. Just select Change Icon from the Properties . . . menu. In the resulting dialog box, select the file from which the icon is to be extracted.

For a more sophisticated and organized

approach to managing files and programs, look at hDC Computer Corp.'s *Windows Express Tool*. It lets you tailor the Windows desktop to meet your own needs. It's especially useful for standardizing workstations and enhancing system security.

WIN.INI LAMENT

Can you point me to a good reference source for explaining the lines in WIN.INI? As new applications are installed or old ones reinstalled, WIN.INI becomes cluttered and glitches can arise in the operation of Windows. For example, I had trouble installing a font card for my laser printer. When I called for technical assistance, I learned that the lines in WIN.INI for the card have to appear before lines for soft fonts. Other "unexplainable" problems have occurred that I suspect have similar roots. Can you provide some guidance?

Gary N. Speed
Little Rock, Arkansas



Windows 2.x users have been somewhat shortchanged because of the fact that there's no good single source for this type of information. You can, of course, read the *Windows*

manual for some of the items. And it's useful to look at WIN.INI itself for a number of otherwise undocumented sections, especially in the [Win386] area. For example, the *Windows/386* manual supplement explains how to use emmsize and windownsize, but says nothing about how to disable certain ALT keystrokes. For help here, you have to read your WIN.INI file.

For some time Microsoft has provided a file for its ONLINE users called SWITCHES.TXT. This file documents most of the settings in WIN.INI for Windows 2.x. Some of the explanations are a bit terse and may require a certain degree of technical knowledge in order to understand. Nevertheless, it's the most complete official list. Microsoft has agreed to make it available for posting on PC MagNet with the caveat that it's no longer being supported. By the time you read this column, you should be able to retrieve it.

Windows 3.0 users will find several .TXT files in the Windows directory devoted entirely or in part to the various settings. You may have to read through them several times to absorb the contents, which are often quite terse.

Whenever possible, you should modify the .INI files indirectly. For example, new fonts are best installed by using the Control Panel rather than trying to enter the correct information yourself. Printer drivers will install the soft fonts themselves from the information you supply in the setup dialog box. Nevertheless, you will have to make many entries by hand. And some DOS programs that support Windows modify WIN.INI outside Windows. For example, Bitstream Fontware adds entries to the [fonts] section of WIN.INI along with comments that clarify the font type and size. As a result, the file can get quite cluttered and errors can be introduced.

Unfortunately, the kind of problem you describe concerning order of entries is rarely documented anywhere; most of the time you find out by word of mouth or trial and error. By grounding yourself with as much information as you are able to obtain from various sources, you can understand and monitor changes to the various .INI files used by Windows. Remember, before you make modifications, always be sure to save the original, in case you make a mistake.

WHEN TO SHARE

I've discovered an incompatibility between Windows/386 applications and MS-DOS

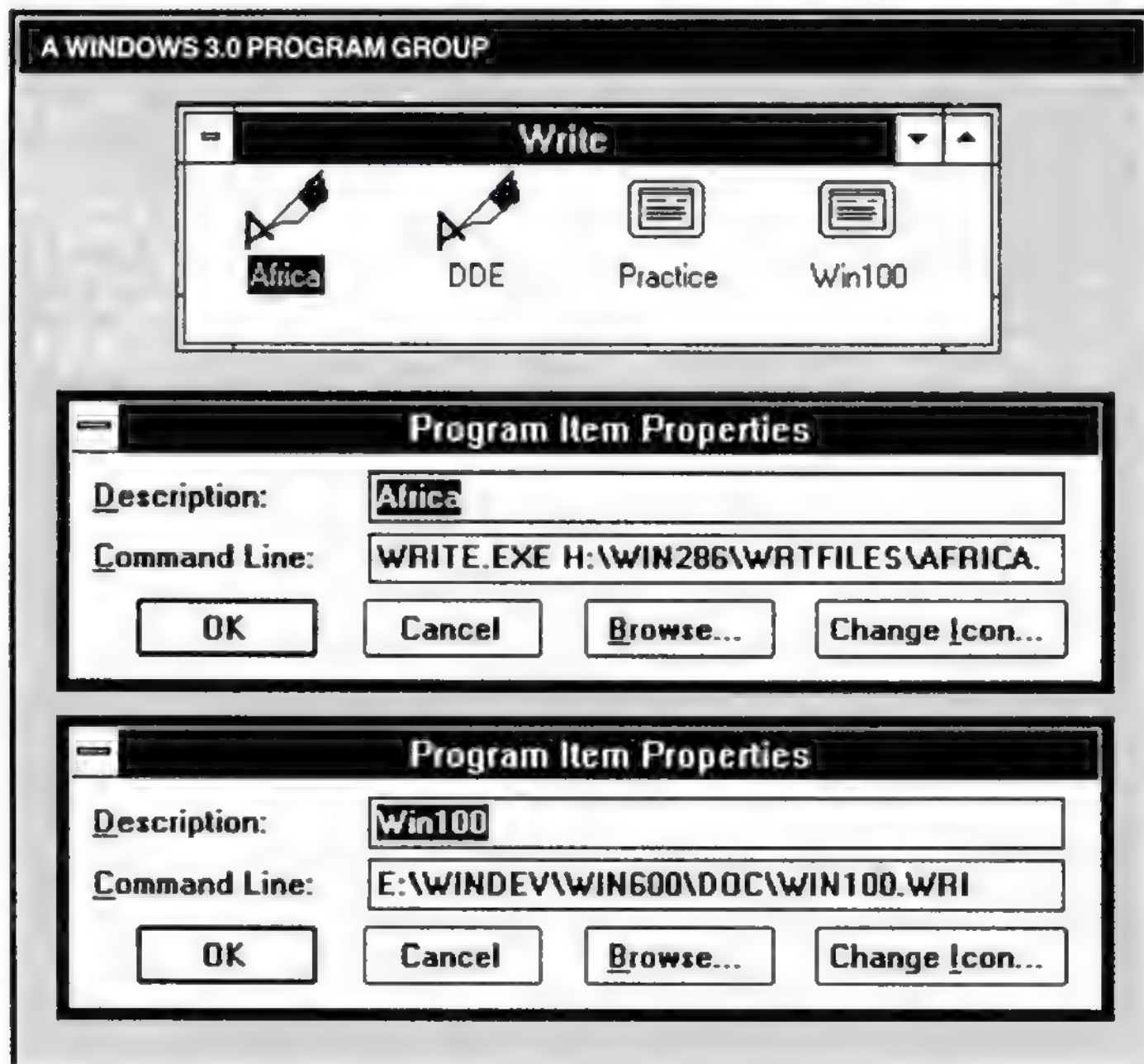


Figure 1: Here's an example of a program group and the properties associated with two of the items in it. Notice how the selection of the command line influenced the choice of icon.

Windows

4.01. When I tried to install both *PageMaker* and *Excel* to run under *Windows/386*, the *INSTALL* utilities refused to recognize the disks that they instructed me to insert! My new Zeos SX system was otherwise performing perfectly with the 65MB single partition hard disk. After replacing the floppy disk drive itself to no avail, I decided to telephone both Aldus and Microsoft. To my amazement, they both told me to disable the *SHARE.EXE* program by renaming the file, and/or removing the following instruction:

```
install=c:\dos\share
```

from my *CONFIG.SYS* file. You get a warning informing you that "SHARE SHOULD BE LOADED FOR LARGE MEDIA!" However, both software companies told me to install all *Windows* applications, including *Windows* itself, without *SHARE*. This trick did solve the problem. Of course, I reenabled *SHARE* after the installation. It makes me wonder whether *SHARE.EXE* is really

needed at all, especially if you're not working on a network.

Louis S. Sacks
Brookville, Maryland



SHARE's original function was to handle file sharing in a network environment. If it's installed, all read and write requests are validated against the file-sharing code with which the file was opened.

But more importantly, by installing *SHARE*, you eliminate possible FCB-type file function calls that might trash your disk. It's also required for handling FCB-type file functions on large disk drives. Some programs, such as *SideKick Plus*, still use FCB functions. And DOS uses FCBs when deleting files.

If a read or write operation occurs when a disk has been changed in the middle of an operation, *SHARE* looks at the volume label to see whether it's the same disk that was previously in the drive. If not, DOS sends an "Invalid disk" error message.

Microsoft definitely recommends that *SHARE* be disabled during the installation of *Windows* applications, as well as during the installation of *Windows/286* or *1386*.

The best way to do this is to rename *SHARE.EXE*, because a *SHELL=* line in *CONFIG.SYS* will cause *SHARE* to be loaded anytime it's in the same directory as *COMMAND.COM*. Rename it to, say, *SHAREBAK.EXE* and then reboot. After the installation is done, put back *SHARE* and reboot the machine.

SHARE is used by DOS 4.0 and 4.01 for disks that are partitioned in greater than 32MB segments. If you boot DOS 4.0 without *SHARE*, you'll get an error message requesting that it be installed. As indicated above, you'll need it to run any program that calls old-style FCB-type file operations. Unfortunately, you probably won't know whether a program uses these until you run it. So, play it safe and install *SHARE*.

OPENING WINDOWS

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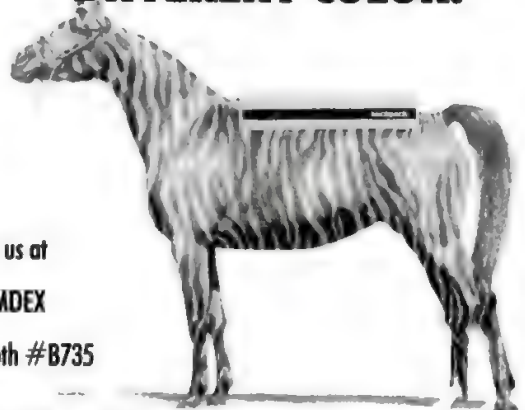
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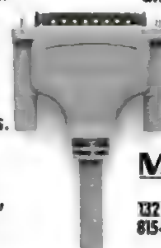
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edited by
Trudy Neuhaus

Databases

HANDLING DUPLICATE RECORDS

It's easy to add duplicate records to a *dBASE III Plus* database, since *dBASE III Plus* does not automatically check for them. And once inserted, duplicates can be difficult to find and remove.

Program 1 (top) in Figure 1 will report duplicate values based on a database name and field name (or expression) that you specify. If the entire record is a duplicate, it reports the record number as well as the duplicate value. Note that the values for the field expression are expanded using the macro operator. Therefore, your field expression can include numeric, string, or date calculations as well as functions that operate on multiple fields.

If you want to eliminate the duplicates on the spot, just replace the IF block with

```
IF .NOT. EOF() .AND. oldval = &fld
  BROWSE
  GOTO oldrec
ENDIF
```

This will put you in the *dBASE* multirecord BROWSE mode and place the cursor on the duplicate record. Then the command GOTO oldrec will put you back into the search where you left off, just in case you modified the index value.

Dave Moe
Calgary, Alberta
Canada



There are two problems that need to be solved regarding duplicates, and every *dBASE* programmer sooner or later encounters both. The first, addressed by Program 1 in Figure 1, is how to detect duplicates that already exist in a database. The second, hopefully learned early in a *dBASE* programmer's career, is how to prevent duplicates from being entered into the database to begin with.

If you've happened upon a database that already contains duplicates, the first step in locating them is to find out what field or expression determines duplication. If the records are indexed on a unique

■ **HANDLING DUPLICATE RECORDS:** If you can't prevent duplicates, use this *dBASE* program to detect them.

field, then that field is a likely candidate. For example, if an employee database is keyed on a social security number, then this is the obvious choice.

But the SSN may not be enough. For example, what if the wrong SSN was accidentally entered, and that SSN happened to be unique in the database? In this case, there could already be an entry with the right SSN, resulting in duplication.

The choices are even less clear if the database does not have an obvious field, such as a unique key field, to check. For example, a typical database of names may include fields such as first name, last name, and middle initial. Searching by first name would certainly result in a long list of po-

DETECTING DUPLICATES IN DBASE III PLUS

COMPLETE LISTING

```
*****
* PROGRAM 1 *
*****

? "Duplicate Record Key Checker"
ACCEPT "Enter database name " TO dbn
USE &dbn
ACCEPT "Enter field name " TO fld
INDEX ON &fld TO tempndx
DO WHILE .NOT. EOF()
  oldval = &fld
  oldrec = recno()
  SKIP
  IF .NOT.EOF() .AND. oldval = &fld
    ? " Record " + LTRIM(STR(recno()))
    ?? " Matches " + LTRIM(STR(oldrec))
    ?? " Value = "
    ?? &fld
  ENDIF
ENDDO
? "DONE. "
```

```
**** Input database name.
** Open database.
** Input name of field
** Index database on field.
** Search through database.
** Save field value.
** Save record number.
** Skip to next record.
** Compare the field values.
** Print message if the same
** Print record numbers

** Print duplicate value

** Repeat until end file
```

```
*****
* PROGRAM 2 *
*****

SET ECHO OFF
SET TALK OFF
? "Duplicate Record Key Checker"
ACCEPT "Enter database name: " TO dbn
USE &dbn
DISP STRU
ACCEPT "Enter field name: " TO fld
INDEX ON &fld TO tempndx
DO WHILE .NOT. EOF()
  oldval = &fld
  oldrec = recno()
  SKIP
  IF .NOT. EOF() .AND. oldval = &fld
    SKIP -1
    DISPLAY &fld WHILE .NOT. EOF() .AND. oldval = &fld
  ENDIF
ENDDO
```

```
**** Input data base name.
** Open data base.
** Display db structure
** Input name of field
** Index data base on field.
** Search through data base.
** Save field value.
** Save record number.
** Skip to next record.

** Backup to first
** Repeat until end file
```

Figure 1: Given a database name and field name (or expression), Program 1 (top) reports duplicate values. If it finds a duplicate record, it reports the record number as well as the value. Program 2 displays the fields you can use in an expression and displays duplicates in a more readable format.

PREVENTING DUPLICATES IN DBASE III PLUS	COMPLETE LISTING
<pre> PROCEDURE Adempl * * Demonstrate general logic for checking for duplicate * keys. Abbreviated version, for illustration * only, dBASE III Plus tested. * adrcno = RECNO() ** Save current recno DO WHILE .T. STORE SPACE(11) TO M_ssn ** Create blank memvars STORE SPACE(25) TO M_name STORE SPACE(40) TO M_address STORE SPACE(20) TO M_city STORE SPACE(2) TO M_state STORE SPACE(10) TO M_zip READ IF READKEY() = 12 ** Display entry screen ** ESC means cancel EXIT ENDIF SEEK M_ssn ** Check for ssn duplicate IF FOUND() @ 8,8 SAY "Record with that key already exists. Try again." @ 9,8 SAY "Press any key to continue." WAIT "" GOTO adrcno LOOP ELSE APPEND BLANK ** No dups, ok to add REPLACE SSN WITH M_SSN ** Replace fields with memvars REPLACE NAME WITH M_NAME REPLACE ADDRESS WITH M_ADDRESS REPLACE CITY WITH M_CITY REPLACE STATE WITH M_STATE REPLACE ZIP WITH M_ZIP adrcno = RECNO() ** New record number EXIT ENDIF ENDPROC GOTO adrcno RETURN </pre>	<pre> PROCEDURE editempl * * Demonstrate general logic for checking for duplicate * keys. Abbreviated version, for illustration * only, dBASE III Plus tested. * STORE RECNO() TO edrcno ** Save current position DO WHILE .T. STORE M_ssn TO M_ssn ** Create memvars from record STORE M_name TO M_name STORE M_address TO M_address STORE M_city TO M_city STORE M_state TO M_state STORE M_zip TO M_zip READ IF READKEY() = 12 ** Display entry screen ** ESC means cancel EXIT ENDIF IF M_ssn <= M_ssn ** If it's been changed SEEK M_ssn ** Check for ssn duplicate IF FOUND() GOTO adrcno ** Restore position after seek @ 8,8 SAY "Record with that key already exists. Try again." @ 9,8 SAY "Press any key to continue." WAIT "" LOOP ELSE GOTO adrcno ** Not found, but we're at EOF ** Restore position after seek IF REPLACE SSN WITH M_SSN REPLACE NAME WITH M_NAME REPLACE ADDRESS WITH M_ADDRESS REPLACE CITY WITH M_CITY REPLACE STATE WITH M_STATE REPLACE ZIP WITH M_ZIP ENDIF ** Replace fields with memvars ENDIF ENDIF EXIT ENDPROC </pre>

Figure 2: Before a new record is added or an existing record updated, these two routines will search a database keyed on social security number and verify that the SSN about to be entered does not duplicate an existing SSN.

tential duplicates. But since many people have the same first name, this isn't a very efficient way to find duplicate records. Similarly, if you base your search on last name, you'll likely find more than one "Smith" or "Jones" that are valid singular identities.

So how can you identify duplicates?

The general approach has to be analogous to a search-and-destroy mission, except that our intent is to search out candidates and examine them (not necessarily destroy them). You must start by identifying each and every expression that will be helpful in identifying duplicate candidates.

For example, consider a hypothetical employee database that contains SSN, name, address, city, and state. The database is keyed on SSN.

Searching for duplicates based on the SSN would identify good candidates, since duplicate SSN's are not allowed. Searching for records where the contents of the name, address, city, and state fields match would also identify strong candidates. (It's unlikely, but possible, that such a match would be valid.) A third search might also be made on the complete name. This may produce some valid entries with the same name (that is, "Smith, John"), but will aid in locating candidates.

The three expressions, therefore, are

- SSN
- NAME+ADDRESS+CITY+STATE
- NAME

If case matters, you might use UPPER with the second and third expressions. And you'd probably include LTRIM and TRIM for each of the fields too.

Now, for each expression, create an INDEX using the expression, make sure the database is using the index, and search for duplicates by comparing consecutive records based upon the expression. (Note: the expressions have to be valid for use with the

```

INDEX ON *expression* TO *index*
file

```

in your dBASE implementation.)

When you use a database with an index, the database appears to be sorted by the index expression. This means that if there are any duplicates for that expression, they will appear to be consecutive in the database file and can be accessed by SKIP. For example, if the database is INDEXed on SSN, the records will appear to be sorted in ascending order by SSN. So if there are two with the same SSN, they'll appear together, back to back. Therefore, for any SSN, you can check for duplicates just by looking at the next record's SSN.

Which brings us back to Program 1 in Figure 1.

Mr. Moe's submission uses this technique and is a handy way of identifying duplicates. It also allows the entry of a complex expression. Using our earlier example, you would run the program in Figure 1 once for each of our three expressions.

A slightly modified version, Program 2, also appears in Figure 1 (bottom). Here, a DISPLAY STRUCTURE command is used to display all the fields you can use to construct the expression. Furthermore, the DISPLAY command will display the duplicates in a slightly more readable format. You might notice that we haven't addressed removing the duplicates once they're discovered. You may be tempted to try to automate this process, automatically deleting records that appear to be duplicates. Resist temptation. The safest way to identify duplicates is to present a report of candidates to a person who is qualified to examine the list and verify duplicates.

Any attempt to automatically remove duplicates will undoubtedly result in records being deleted that are not true duplicates, but just plain and simple data entry errors.

One alternative, suggested by Mr. Moe, is to substitute a BROWSE com-

Databases

mand which, in Program 2 (Figure 1), would replace the DISPLAY command. In this way the data entry person will be able to massage the database interactively as duplicate candidates are identified (assuming this person has the ability to verify true duplicates).

All of the above is fine for finding and removing duplicates that already exist, but a well-designed system should work hard to prevent their entry to begin with. So the question that still remains is, how do you prevent duplicates from being entered in the first place?

The answer lies in building some defensive programming techniques into your applications.

In our hypothetical employee database, only one record should exist for each SSN. To prevent duplicate keys from being entered, we must check for the existence of a record with that SSN before adding the new record. Similarly, if the user changes the SSN during editing, we must check for existence of the new SSN before allowing

the database to be updated.

Figure 2 illustrates two example routines to add and edit records respectively to our employee database. A sample program

How do you prevent duplicates from being entered in the first place? The answer lies in building defensive programming techniques into your applications.

that uses these routines with a sample database is available for downloading from PC MagNet. If your dBASE implementation supports user-defined functions and the

VALID clause for @ SAY..GET, you can consider moving the duplicate checking into a UDF for testing with VALID. This is especially valuable if you're editing "directly" into the database via EDIT or APPEND and a format file, as opposed to using memory variables and the REPLACE command.

If your database does not have a unique key—and even if it does—you can help prevent duplicates by scanning the database for "similar" entries prior to allowing updates. This could be accomplished by searching on a partial key, partial field value, or by using a SOUNDEX() function or similar function to identify values that sound alike.

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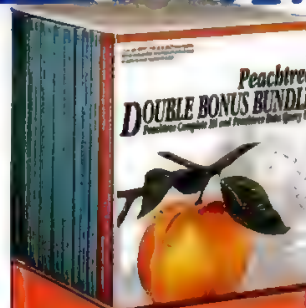
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Spreadsheets

INCREMENTAL STEPS IN EXCEL MACROS

When *Microsoft Excel* encounters the instruction

=STEP()

in a macro, it displays the next macro instruction in a dialog box and allows you to Step, Continue, or Halt macro execution. The default choice is Step, so if you press Enter, the macro proceeds to the next command. Execution continues one step at a time until you press Continue or Halt.

What the *Excel* manuals don't tell you is that if you press Shift together with Enter, *Excel* successively evaluates each argument of the current command and displays the results in the dialog box. Each time you press Shift-Enter, *Excel* performs another evaluation; it doesn't move on to the new macro command until you've seen all the results of the current command. New commands are always displayed in normal typeface, and evaluated results are displayed in italics.

I have found this technique extremely helpful. It lets me see exactly where within a macro statement a problem is occurring.

Joan S. Abrams
Cambridge, Massachusetts



This incremental step mode does indeed appear to be an undocumented feature of *Excel*. To get a feeling for how it works, run the macro shown in Figure 1.

When you execute this macro, *Excel* immediately encounters **=STEP()** in A2 and presents the Single Step dialog box. The instruction displayed in the dialog box is the first one *after* STEP—in this case the statement

Index=1000

Note that this instruction appears in normal roman characters in the dialog box.

Now press Shift-Enter to take your first incremental step. The dialog box responds

■ **INCREMENTAL STEPS IN EXCEL MACROS:** An undocumented feature lets you step through not only the instructions but the individual arguments as well.

■ **ADD STEP FORMULAS ON THE FLY:** Step through an *Excel* macro without having to enter the statements manually.

■ **COMMENTING MACROS IN 1-2-3:** In long, complex macros, two procedures help you keep comments on-screen.

by displaying—in italics—a modified form of the instruction at A3:

=SET.NAME("Index",1000)

This SET.NAME function is simply another form of the instruction that appears in our macro. *Excel* lets you assign a value to a variable with a statement of the form

name=value

but it uses the SET.NAME function to re-

cord the assignment. So the first incremental step simply converts the instruction in A3 to the format that *Excel* prefers.

Press Shift-Enter again and *Excel*'s dialog box displays

TRUE

After carrying out the instruction in A3, the SET.NAME function will return the message TRUE, which indicates (in effect) "mission accomplished." Most macro functions that cause *Excel* to take a particular action return TRUE after they've been executed. You can verify this by using the Display command on the Options menu to remove the Formulas display of your macro text. Before you run a macro for the first time, you'll find that most of your action functions will return FALSE; afterward, they'll say TRUE.

The next time you hit Shift-Enter, it takes *Excel* to the instruction at A4. This instruction

index=index/2

appears in the dialog box in roman characters. Press the Shift-Enter combination again; *Excel* redisplay the instruction in italic, converts it to the SET.NAME format, and calculates the term on the right side of the equals sign. The final result displayed is

=SET.NAME("index",500)

On your next Shift-Enter, the display changes to **TRUE**, again indicating that our request was carried out successfully. Figure 2 shows the instruction at A4 and the first Shift-Enter result.

When you press Shift-Enter again, *Excel* moves on to the instruction at A5 and displays its text

=IF(index>300,GOTO(A4),BEEP())

in roman characters. Now, when you take your next incremental step, you will arrive

INCREMENTAL STEPS IN EXCEL MACROS

	A
1	Abrams
2	=STEP()
3	Index=1000
4	index=index/2
5	=IF(index>300,GOTO(A4),BEEP())
6	=RETURN()

Figure 1: This short sample macro will be used to illustrate the Shift-Enter feature in *Excel*'s STEP formula. Execute this key combination to display the results of macro statements.

Spreadsheets

at the following statement:

```
=IF(GOTO($A$4),BEEP())
```

Here, *Excel* has converted the address A4 into an absolute-cell specification, which presents no mystery. But it has also evaluated the term,

```
index>300
```

found it to be TRUE, and compressed the IF function to the rather peculiar form shown above. Like the conversion we saw earlier (of *name=value* to the corresponding SET.NAME function), this metamorphosis just reflects the way *Excel* processes IF statements internally while executing our macros. There is one important thing to note when you're incrementally stepping through a macro: functions in which the *logical_test* argument proves true will appear in the Single Step dialog box with both the *value_if_true* and *value_if_false* arguments (unless, of course, you haven't provided a *value_if_false* argument).

Your next Shift-Enter takes you back to the variable assignment instruction at A4, which *Excel* handles the same way it did earlier. So the next four steps produce

```
=SET.NAME("index",250)
TRUE
=IF(index>300,GOTO(A4),BEEP())
=IF(BEEP())
```

As you can see from the last item in this sequence, when the *logical_test* argument of an IF function proves false, *Excel*'s Single Step dialog box displays the statement with just the *value_if_false* argument.

The rest of the Single Step display for this macro is straightforward. Our next Shift-Enter beeps the speaker and displays the result TRUE. Pressing Shift-Enter again takes us to the last instruction

```
=RETURN()
```

which appears in roman. One more Shift-Enter displays the same instruction in italics and terminates the macro.

The incremental step feature was probably never intended for public consumption. In addition to producing some cryptic displays (like the compressed IF statements shown above), it disappoints by oc-

asionally performing more than one calculation at a time.

For example, if you have two complex terms joined by an arithmetic or concatenation operator, the incremental stepper will first solve for the term on the left of the operator. Then, in its next step, it will both solve the right-hand term and execute the operator—in effect, carrying out two calculations at once.

Nevertheless, it provides more information than you would get by walking

combination. Now, whenever I want to single-step through a macro, I select the cell where I want single-step execution to begin, then press Ctrl-R.

Don Baams
Sylmar, California



My guess is that this macro would be a welcome addition to most users' macro libraries. It not only saves you the trouble of inserting =STEP() instructions in a macro, it also

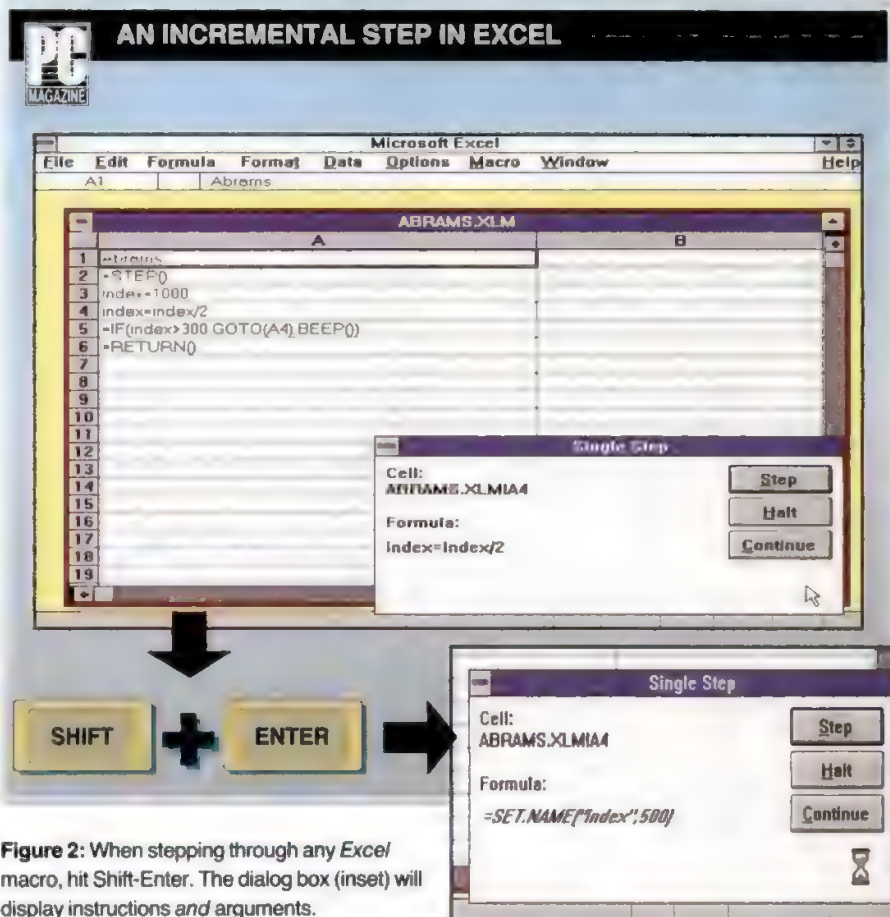


Figure 2: When stepping through any *Excel* macro, hit Shift-Enter. The dialog box (inset) will display instructions and arguments.

through a macro with the Step button. Try it out next time you're on the hunt for some particularly elusive bug.

ADD STEP FORMULAS ON THE FLY

I frequently use *Excel*'s Step feature to debug macros, but I find it a nuisance to add =STEP() statements to the body of each macro I want to trace. Instead, I use the following short macro:

```
=STEP()+RUN(ACTIVE.CELL())
=RETURN()
```

to which I've assigned the Ctrl-R keystroke

lets you begin execution of a macro at any particular instruction.

COMMENTING MACROS IN 1-2-3

Macro developers usually organize their work in a three-column format, with labels aligned in the first column, macro commands in the second, and comments in the third. This is fine for many situations, but it becomes irritating when the commands are wide enough to push the comments off-screen. The problem is compounded when complex command entries require detailed comments!

Probably the most damning criticism of the method is that the comments are sel-

Spreadsheets

dom read. Scrolling the screen left and right to read both code and comments can be a nuisance. The result? Users often disregard the comments and developers don't maintain them when upgrading the code.

Consequently, I prefer to embed comments in the macro code itself. In *Lotus 1-2-3*, I created a {COMMENT} procedure

```
Comment {DEFINE CommentText}
          {RETURN}
CommentText
```

This subroutine simply accepts a string parameter and returns to the main macro. It has no effect on the macro or its variables, because it does nothing.

To demonstrate the technique, I supplied the sample macro in Figure 3—a portion of my personal accounting system. Note that you can include long commentary in a macro by placing several comments in sequence. The comments can also be included within command lines, like this:

```
{GOTO}A11~
{L 2}{COMMENT Forces scrolling}
{R 2}{COMMENT "Same cell, new
display"}
```

This method is a lot easier to understand than the apparently illogical sequence

```
{GOTO}A11~
{L 2}{R 2}
```

Note that if your comments include com-

mas, semicolons, or any other macro-language delimiters, you must be sure to enclose the entire comment in quote marks (as in the "Same cell, new display" example shown above).

With this COMMENT procedure, I can ensure that the comments are read and increase the likelihood that they will be updated when the macro is modified or enhanced. The method also guarantees that macro printouts will include the commentary. You may want to argue that repeated

**Use a simple 1-2-3
subroutine to embed
comments into macro
code. The routine,
which doesn't affect
the macro, ensures
that long comments
will be read.**

calls to a COMMENT procedure will slow down your macros. But I have found that the time penalty for doing this is negligible and that there is no obvious performance difference, especially if you use 286 or 386 hardware.

Dermot Shinnars-Kennedy
Limerick, Ireland



Many macro writers will share Mr. Shinnars-Kennedy's dislike of the traditional three-column approach to commenting. However, not everyone will agree that the performance degradation caused by repeated calls to a do-nothing macro is negligible. To test the speed of this method, I added a {COMMENT} call to each line of a 10,000-line loop. On my 16-MHz 386 machine (without co-processor), the loop ran in 16 seconds without the comments and 51 seconds with them.

To speed things up, try this alternative to embed comments. Rather than a subroutine, you can use {IF} statements, as in

```
{GOTO}A11~
{L 2}{IF 0}*** Forces scrolling
{R 2}{IF 0}*** Same cell, new
display
```

This method works because 1-2-3's macro processor ignores any statements to the right of an {IF} statement whose argument proves to be false. 0 is false by definition, so any text to the right of {IF 0} is ignored by 1-2-3's macro processor. You can put anything you like out there, with or without commas, semicolons, braces, or even upside-down exclamation points.

This method imposes a smaller overhead, because no subroutine calls are involved. Indeed, processing an {IF 0} statement on each pass through my 10,000-line test loop raised the execution time from 16 seconds to 32 seconds. The overhead, however, is still significant.

Although it increases performance, the {IF} approach is less flexible than Mr. Shinnars-Kennedy's {COMMENT} subroutine; {IF 0} doesn't let you place comments between two statements on the same line. The {IF 0} method is also more ersatz: a person looking at a macro full of comments for the first time might be bewildered by all that strange-looking IF logic. But if you're set on mixing comments in with your macro code, this is a leaner and meaner way to go.

HINTS, TIPS, QUESTIONS

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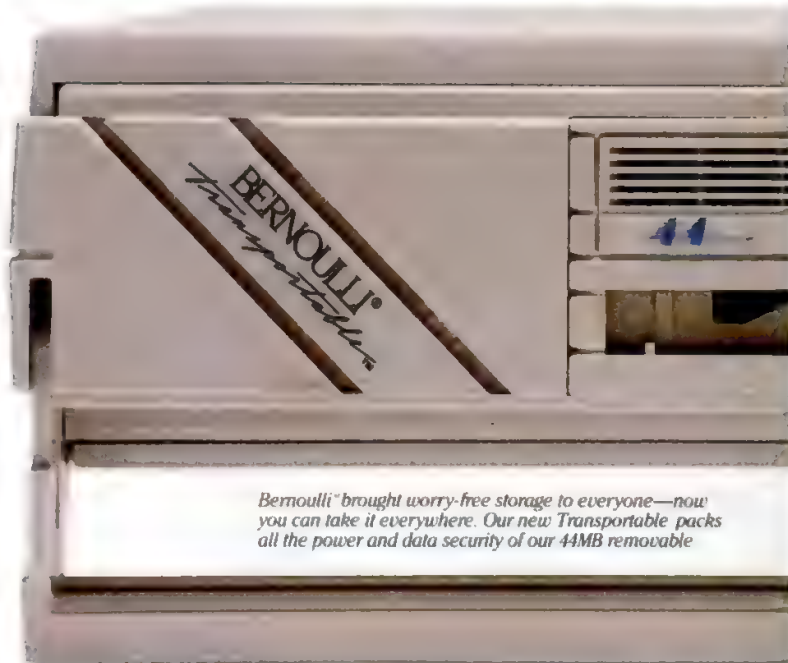
SAMPLE MACRO WITH COMMENT PROCEDURES		
	A	B
1	Comment	{DEFINE CommentText}
2		{RETURN}
3		
4	CommentText	
5		
6	\D	{COMMENT With CellPointer in Account Type column scan for}
7		{COMMENT DEPOSIT accounts only}
8		{GOTO}A11~
9	Next	{DOWN}
10		{IF @CELLPOINTER("TYPE")="B"}{QUIT}{COMMENT Stop when blank}
11		{IF @CELLPOINTER("CONTENTS")<>"DEPOSIT"}{BRANCH Next}
12		{RIGHT}
13		{COMMENT CellPointer now in Amount column}
14		{COMMENT Ignore small accounts}
15		{IF @CELLPOINTER("CONTENTS")<500}{LEFT}{BRANCH Next}
16		{RIGHT}{Processed}{COMMENT Assume entry is processed somehow!}
17		{LEFT 2}{COMMENT Now in Account Type col. again}{BRANCH Next}

Figure 3: This sample macro illustrates a procedure, COMMENT, which embeds comments into the code without affecting the outcome of the macro. In long, complex macros, this method increases the likelihood that your comments will be read.

THE NEW B ANY SYSTEM. ANY



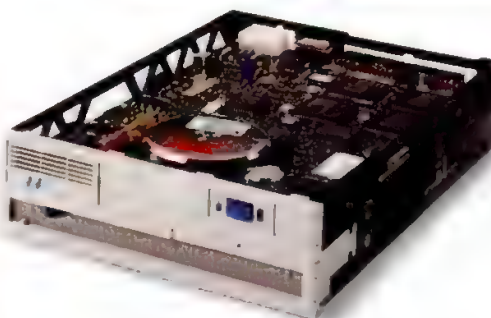
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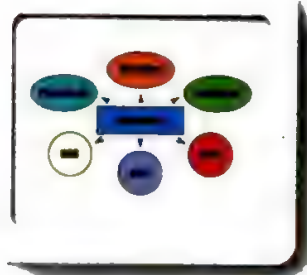


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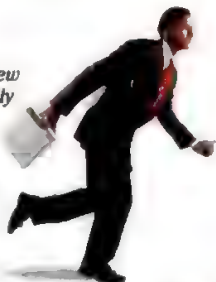


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BOARDSKI MARKET APPRAISAL OBJECTIVES

- To determine the market potential for the product, the BoardSki.
 - Can the overall concept in sports be successful?
 - Is there a particular market for this product?
- To evaluate the market's response.
 - Will present owners of the product purchase the BoardSki?
 - Is the proposed price of the product acceptable?
- Advertising Strategy.
 - In what medium are prospects most likely to be reached - television, radio, newspaper, etc.
 - What is a ballpark figure for the cost of a product rollout expected in order to reach the target market?
 - What are the results of user group testing?
 - Should ads be geared towards promoting the product or initiating a purchase decision?
- Distribution of product.
 - Should the BoardSki only be marketed through sporting goods stores and outlets?
 - Should an on-site rental chain be established at beaches, and roller parks and rinks?
 - What are the pros and cons of retail distribution?

BOARDSKI REPORT # 24
Breakdown of West Coast Market by Age Group: Male

"Television is the best medium for reaching our target market."
"The largest buying potential is males between the ages of 5 and 24."
"A related sportswear line is being suggested for consideration."

Age Range	Annual Income	Owns Skateboard	Owns Snowboard	Owns Ski
5-12	00.00	21%	20%	35%
12-18	2,500.00	37%	15%	15%
19-24	20,000.00	29%	9%	0%
25-34	32,000.00	11%	0%	0%
35-49	38,000.00	3%	0%	0%

ANALYSIS:

Due to the proximity of the ocean, the mountains, and a large number of parks, the metropolitan Los Angeles area represents the ideal market to introduce the BoardSki. The age group with the largest buying potential is males between the ages of 5 and 24.

Surveys indicate that television is the best medium for reaching this market, perhaps by utilizing cable stations with an all-music format. Other possible media buys include FM radio stations and college newspapers.

On a related note, a line of sportswear has been suggested, marketed mainly to the teens of the 5 to 12 age group. Once a market for the product has been established, a clothing line could be developed around a theme for the product, i.e., t-shirts, sweatshirts, and winter nylon pajamas have been proposed.

PROJECT OVERVIEW

CONCEPT
Atrusport is a new, all-in-one piece of sporting equipment that can be used in any environment to whip down your skateboard wheels, and strap on your snowboard down.

PROBLEM
Atrusport is a new, all-in-one piece of sporting equipment that can be used in any environment to whip down your skateboard wheels, and strap on your snowboard down.

SCHEDULING
Atrusport is a new, all-in-one piece of sporting equipment that can be used in any environment to whip down your skateboard wheels, and strap on your snowboard down.

by
Craig L. Stark

The Working Word

FINDING THE END OF A WORD

Writing a *WordPerfect* macro that takes you to the *end* of a word (as Ctrl-Right takes you to the beginning of the next word) is not, by any means, an easy task. First, the macro must identify many types of word boundaries: space, tab, decimal tab, indent, hard return, soft return, or page break. Second, the macro must distinguish a word end from a *WordPerfect* control code, such as [bold]. Third, if the cursor is currently at the beginning or middle of a word, then the macro should take the cursor to the end of that word. But if the cursor is already at the end of a word, then the macro should take it to the end of the *next* word. Fourth, and most importantly, the macro should be fast: no one accustomed to the speed of Ctrl-Right wants anything less. And the Alt-L macro shown in Figure 1 meets all of these requirements.

The first part of Alt-L (lines 2 to 25) checks to see whether or not the cursor is currently at the end of a word. First the macro assigns a variable, which is called *ThisChar*, to the cursor character or code. The CASE statement in lines 5 through 15 checks to see if the variable is a word boundary—space, carriage return, regular tab, indent, shift-indent, decimal tab, or right tab. The latter two are checked through their numeric system values, since they cannot be entered directly into the macro editor. Furthermore, since a usable SYSTEM variable value does not seem to exist for the word-boundary codes [SRT], [SPg], and [HPg], I simply use another CASE statement in lines 20 through 25 to check for these codes using the corresponding KTON numeric values.

The IF statement in lines 17 to 19 checks to see if the cursor character or code is a formatting code (such as [Center] or [BOLD]) that is not a word boundary. If the cursor character is such a code, the macro cycles back to line 2 and checks the next character. (You might want to note that the IF statement cannot be put before the CASE statement, because some of the word boundaries, such as decimal tab,

■ FINDING THE END OF A WORD: A clever *WordPerfect* macro not only takes you to the end of a word without losing speed, but it can also share some powerful programming techniques.

have system-variable values greater than 49000.)

If the macro determines that the current cursor position is a word boundary, then it

will simply skip to the next word in the line (lines 26-27). Otherwise, it will continue with the second part of the macro (line 28), which searches for the end of the current word.

The secret to the speed of this macro is the particular search technique I use to find the word boundary. Rather than moving *forward* one character at a time until reaching the word end, the macro first jumps to the next word's beginning (using Ctrl-Right). It then goes *backward* until it reaches a word end. Other than this change in direction, the logic of section 2 (lines 28 to 56) is similar to that of section 1: The macro moves left one cursor position and reads the current char-



Figure 1: This speedy macro takes the cursor to the end of the current word rather than the beginning of the next word—as Ctrl-Right does. Central to the macro's logic are *WordPerfect* 5.1's new {SYSTEM} and {KTON} commands. These commands can find the numeric value of all codes and characters, and thus the macro can determine the contents of each cursor position.

The Working Word

ALT-L

2 of 2

```
(CASE){VARIABLE}ThisChar""
  PrevChar"
  {Enter}PrevChar"
  {Tab}PrevChar"
  49472PrevChar"  {;}Decimal tab"
  49482PrevChar"  {;}Right tab"
  {Indent}PrevChar"
  {L/R Indent}PrevChar"
  35840PrevChar"  {;}This is [HRT-SPg] code"
  {ELSE}CodeCheck2"
  {LABEL}CodeCheck2"
  {IF}{VARIABLE}ThisChar">49000"
  {GO}PrevChar"  {;}Current char is a WP Code such as [bold]"
  {END IF}
  {CASE}{KTON}{VARIABLE}ThisChar""
  32781PrevChar"  {;}This is [SRT] code"
  32779PrevChar"  {;}This is [SPg] code"
  32780PrevChar"  {;}This is [HPg] code"
  {ELSE}EndQuit"
  {LABEL}EndQuit"
  {Right}{QUIT}
```

acter into a variable using the {SYSTEM} RIGHT command. If the value of the variable is not a word boundary or a *WordPerfect* code, the macro will stop; otherwise, it continues to move left.

At this time I must note a minor programming decision I made, which may or may not appeal to everyone. Consider this bolded word: [BOLD]ABC[bold]. My macro will take you past the C and stop; it will not go past the closing [bold] code. In this way, it behaves similarly to the Ctrl-Right command, which would move the cursor just past the [BOLD] code rather than stopping it before the code.

In a nutshell, this macro reads the current cursor character into a variable by way of the {SYSTEM}RIGHT macro command. It then interprets the character, either directly or (when necessary) by using the numerical value equivalent obtained from the {KTON} macro command. Although they are very powerful, these two new commands are poorly documented in the *WordPerfect 5.1* user's manual. Some discoveries I made while using them might be helpful to others.

The {SYSTEM}RIGHT command returns the character or code in the current cursor position. Its counterpart, the {SYSTEM}LEFT command, returns the character or code to the left of the cursor. The value returned by these commands for ordinary alphanumeric characters such as Z, a, or 8 is simply the character itself. But for *WordPerfect* codes such as [DEC TAB], the value returned by the {SYSTEM} commands is not documented in the manual;

this means that you'll have to do some detective work in order to find them. From my own investigation, I have found that the {SYSTEM} value for [DEC TAB] is 49472, while the value for [Rgt TAB] is 49482. For

The secret to the speed of this end-of-word macro is the search technique used to locate the word boundary: The macro jumps to the next word's beginning and moves backward until it finds a word end.

[BOLD], the value is 49932, but for [bold] it is 50188. In general, the SYSTEM value for control codes is a number greater than 49000.

The {KTON} command also converts a character or code into a numeric value, although {KTON} does not return the same values that the {SYSTEM} command does.

For an alphanumeric character, the {KTON} command returns the corresponding ASCII value, not the character itself. Sometimes you will have to use {KTON} rather than {SYSTEM}. The reason: for some *WordPerfect* codes, such as [HRT] or [SPg], the SYSTEM variable does not return usable numeric or other values that can be assigned to a variable.

Bala G. Dharan
Rice University, Houston



Those of you who would prefer to stop at the end of a word will indeed find Prof. Dharan's macro a fast alternative to Ctrl-Right. However, the greatest contribution may not be in the work performed by the macro, but rather in the information about word boundaries. Finding and using these various delimiters is necessary in all kinds of word processor functions, from spell checkers to search-and-replace operations.

Since *WordPerfect* does not supply a list of the numeric values of these codes, Prof. Dharan supplied two very short macros that identify the character and code values returned by the {SYSTEM} and {KTON} commands. SYSVAL.WPM is simply

```
{DISPLAY OFF}
{ASSIGN}1 {SYSTEM}RIGHT"
{PROMPT}SYSTEM variable value of
this code is {VARIABLE}1"
{WAIT}20 {QUIT}
```

and similarly, the code for KTON-VAL.WPM is simply

```
{DISPLAY OFF}
{ASSIGN}1 {SYSTEM}RIGHT"
{PROMPT}KTON value of this code is
{KTON}{VARIABLE}1"
{WAIT}20 {QUIT}
```

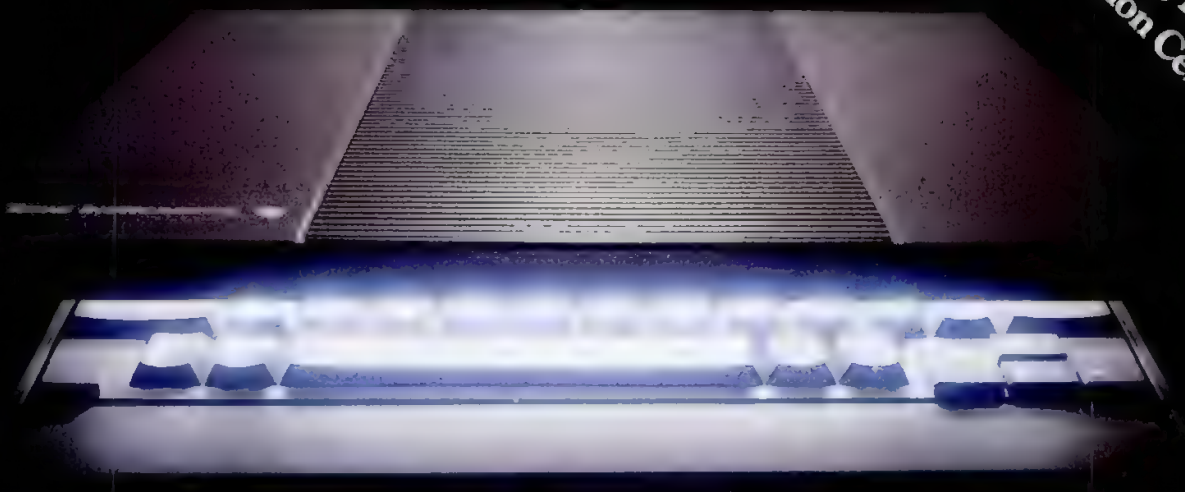
If you're using these with a fast 386 machine, you may wish to increase the WAIT value.

TIPS FROM WORKING WORDSMITHS

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to be crazy to it sure helps.



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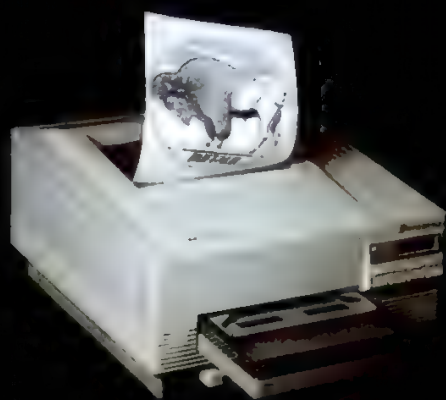
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by
Neil J. Rubenking

User-to-User

YOUR MOVE

I've found the BASIC NAME...AS command to be very useful. It moves only the directory entry, not the contents of a file. This is much faster, and it eliminates any full-disk errors or fragmentation that can occur with the traditional copy-then-delete technique of moving files.

The BASIC program in Figure 1 is a simplified implementation of this feature. It lets you easily move a file about on a disk, either to a new directory, a new name, or both.

This trick won't work between disks, and since the program doesn't accept wildcard characters, it is designed to rerun itself until no filename is entered.

William E. Davis
Seattle, Washington

 I usually use RENAME to change the names of files and a utility like MV.BAS to move them around. I don't like having to retype the file's name after the new path, so to avoid this I added line 65 to the listing in Figure 1. Now I can include *only* the new pathname for the new file, as long as I end it with a backslash. For example, if the old filename is PC.MAG and the new path is \LOVE\THAT\, the resulting file will be \LOVE\THAT\PC.MAG.

The NAME...AS command uses DOS function 56h, introduced in DOS, Version 2.0. When this function renames a

■ **YOUR MOVE:** Here's a BASIC program that will move your files without copying their contents.

■ **REAL SECURITY:** Wiping out sensitive data files isn't as easy as we thought.

■ **PLAYING YOUR (WILD)CARDS RIGHT:** The DIR command interprets a single asterisk differently from other internal DOS commands.

file's full path, it effectively "moves" the file into a new directory. Only the directory entry changes—the file data remains untouched. Starting with DOS 3.0, the same function can also rename a subdirectory, but the NAME...AS command doesn't allow this.

If your intention is to move a file to a new directory, using MV.BAS is a lot safer than copying and deleting it. Note that you can move to and from SUBST drives, too, as long as they're on the same *physical* disk. If U: and V: both represent directo-

ries on your C: drive, it's perfectly legitimate to move and rename a file from U:\FOO to V:\BAR.

REAL SECURITY

Some time ago you published an article on completely deleting sensitive files by using DEBUG to overwrite the file with nonsense. I've developed a file security system for the PC and I know that security—*real* security—is important for users.

There are two problems with the advice in the article. The first problem is less important: If you have a file larger than your free memory, you can't use this method. DEBUG isn't able to load the file into memory, so BX:CX will be zero, and you'll end up with an error message.

The second problem is the real security problem. The procedure just doesn't operate perfectly. You can test it using a very simple method:

- Take an empty floppy disk;
- create two short files, first A.A and then B.B (the latter containing the so-called secure data);
- delete file A.A;
- try to overwrite file B.B with DEBUG, as the article indicates;
- look at the floppy and you'll see that the sectors belonging to file B.B have not been overwritten.

Of course these sectors cannot be retrieved with an unerase utility, but they can be analyzed. On a hard disk the problem is the same, but it's just more difficult to find the sectors that belonged to the file.

The problem results from DOS's file handling. When you ask DEBUG to rewrite the file with nonsense, DOS finds that the file already exists, truncates it to zero length, and frees all the clusters that were attached to the file. Then, when it writes the contents of the file to disk, DOS allocates clusters from the free clusters pool. These clusters won't necessarily be the ones that belonged to the file, so the sensitive data won't be overwritten.

László Éltető
Budapest, Hungary

MV.BAS

COMPLETE LISTING

```
1 'MV.BAS W.E.Davis 19890809
10 ON ERROR GOTO 60000
20 PRINT : INPUT "Old filename"; F1$: IF F1$ = "" THEN END
30 INPUT "New filename"; F2$: IF F2$ = "" THEN END
40 IF INSTR(F1$+F2$,"*") THEN BEEP: PRINT "Cannot contain *": GOTO 20
50 IF INSTR(F1$+F2$,"?") THEN BEEP: PRINT "Cannot contain ?": GOTO 20
60 IF INSTR(F1$+F2$,".") THEN BEEP: PRINT "Cannot contain .": GOTO 20
65 IF RIGHT$(F2$,1)="/" THEN F2$=F2$+F1$
70 NAME F1$ AS F2$: PRINT F1$; " moved to "; F2$
80 GOTO 20
60000 IF ERR = 53 THEN BEEP: PRINT F1$; " does not exist": RESUME 20
60010 IF ERR = 58 THEN BEEP: PRINT "Cannot create "; F2$: RESUME 20
60020 ON ERROR GOTO 0
```

Figure 1: This little BASIC program can "move" a file about on a disk, either to a new directory, a new name, or both. It performs these functions without copying and deleting the file's contents.

User-to-User



Mr. Éltető is quite correct in his thinking. The DEBUG process may work, but there's certainly no guarantee that it will. I tested the process before describing it in this column, but I performed the tests on *blank* floppy disks with no deleted files. On those diskettes it worked perfectly.

Note that if you attempt to overwrite a data file by **COPY**ing another file over it, you'll get the same result. DOS first frees the clusters used by the old file, then allocates a new set of clusters that may or may not include the old ones. Different DOS versions use different strategies for choosing what clusters to use, but chances are that you will *not* successfully overwrite the data.

To successfully overwrite a file's data, you need to use a program that opens the file for random read/write access and writes nonsense over the data without closing the file. In this way DOS never has occasion to free the file's clusters and allocate a new set. **KILLER.BAS**, a BASIC program that appeared in my April 10, 1990, column, works in this fashion. I've checked the exact sectors occupied by a number of files before and after using **KILLER.BAS**—**KILLER** works.

PLAYING YOUR (WILD)CARDS RIGHT

I have a quick comment on the delete/verify batch file that appeared in your May 30, 1989, issue. DOS parses the * wildcard character differently when it's used with the internal command **DIR** than with **DEL** or **ERASE**. Specifically, with **DIR**, a terminal asterisk fills out to the end of the entire filespec (that is, the entire 11-character name and extension), while the **DEL** command fills only to the end of the field (either name or extension). For example, **DIR M*** will display a file named **MOUSE.COM**, but **DEL M*** will *not* delete this file.

Accordingly, the batch file you printed may fail to show the deleted files correctly, although the error will be on the side of safety. That is, some files displayed may not be deleted, which is better than not displaying files that have been deleted. This difference is true of MS-DOS 4.01, and was also true of at least the latest version of the DOS 3.x series.

Robert W. Thompson
Chicago, Illinois

DIRDEL.BAT

COMPLETE LISTING



```
@ECHO OFF
IF "%1"=="" GOTO NoParam
ECHO The following files will be deleted:
DIR /W %1
ECHO .
ECHO Press Ctrl-C to abort, or
PAUSE
ERASE %1
REM ***** NEW lines begin here *****
ECHO Deleted "%1" -- now checking results . . .
IF NOT EXIST %1 THEN GOTO noReadOnlys
REM To create ^G in the next line, hold Ctrl and press G.
ECHO
ECHO At least one file matching "%1" was a Read-Only file
ECHO and hence was not deleted by the "DEL %1" command.
:noReadOnlys
DIR %1 | find "bytes free" > XXXXXXXX.TMP
COPY XXXXXXXX.TMP YYYYYYYY.TMP > NUL
DEL XXXXXXXX.TMP
IF NOT EXIST YYYYYYYY.TMP GOTO end
DEL YYYYYYYY.TMP
REM To create ^G in the next line, hold Ctrl and press G.
ECHO
ECHO DIR showed you some files matching "%1" that DEL did not
ECHO delete. Press a key to see files matching "%1".
PAUSE > NUL
DIR /W %1
REM ***** NEW lines end here *****
GOTO End
:noParam
REM This is the message the internal DEL gives!
ECHO Invalid number of parameters
:End
```

Figure 2: This batch file handles a difference in the way **DIR** and **DEL** interpret the asterisk wildcard.



DIR is an oddball command in DOS versions all the way back to 2.0. **DEL** and most other commands interpret **M*** as **M***—files beginning with **M** and having no extension. **DIR** interprets it as **M*.***—files beginning with **M** and having *any* extension. The **FOR** command and **IF EXIST** test both work like **DEL**.

DIR filespec indeed may list files that **DEL** filespec won't delete. This probably is better than deleting files that **DIR** doesn't list. But if you want to *know* when this happens, modify the **DEL.BAT** file as shown in Figure 2.

DIRDEL.BAT adds new lines after the **ERASE %1** command. First the **IF EXIST** test is run on the original filespec. **IF** and **ERASE** interpret the filespec the same way, so if any files remain they must be Read-Only files. **DIRDEL** issues a warning and continues.

It's harder to test for files that **DEL** ignores. **IF EXISTS** won't work, so it takes three steps and two temporary files to determine if **DIR %1** is finding any files. First pipe the output of **DIR %1** through the **FIND** filter, looking for the string "bytes free", and redirect the result to a temporary file. Next copy this temporary file to another temporary file. Finally, test

whether the second temporary file exists. If it does, **DIR** found some files.

Why does this work? The **DIR** command displays a "bytes free" message *only* when it finds one or more matching files. If the **FIND** command doesn't find any lines matching its input string, its output is a zero-byte file. DOS's internal **COPY** command won't copy a zero-byte file, so if the second temporary file exists, we know the first one wasn't a zero-byte file. Thus if the second temporary file exists, it implies the continued existence of one or more files matching the filespec.

This is a lot of baggage to add to the simple **DEL.BAT**. It might be simpler to write a program in BASIC or Pascal to do the same thing. But it's comforting to know that if necessary we *can* do the job entirely in DOS's batch language.

SHARE YOUR SECRETS

Reveal your latest DOS and systems discoveries through User-to-User, and we'll pay you \$50 for any submissions we print. Please submit your letter on a disk together with a printout. Mail your contributions to User-to-User, *PC Magazine*, One Park Avenue, New York, NY 10016, or upload them to PC MagNet (see the "By Modem" sidebar in the Utilities column). ■

by
Jeff Prosise

Tutor

CHOOSING A HARD DISK

What's the difference between ST506, ESDI, and SCSI hard disks and hard disk controllers? What do the terms MFM and RLL mean? And if I'm about to buy a hard disk, which should I choose?

Gregg A. Contreras
Playa del Ray, California

 ST506, ESDI, and SCSI are hard disk interfaces—specifications that define the electrical signals hard disks and controllers use to communicate. MFM and RLL are encoding schemes used to record data on the magnetic surfaces of hard disks. Which choices are best for you depends on what type of PC you have and what you're looking for in terms of storage capacity and performance. But first, it helps to understand what these terms mean.

Every hard disk and controller has to play by a set of rules that govern how they talk to each other. One of the first drive-to-controller interfaces developed for the IBM PC—and still one of the most widely used—is ST506. Designed by the drive manufacturer that eventually became Seagate Technology, ST506 is a relatively unsophisticated interface (by today's standards), which offers a modest 5-megabit-per-second data transfer rate, at an equally modest price. Although it uses a 20-pin data cable and places bits on the PC's data bus in parallel, the ST506, like most hard disk controllers, is still basically a serial data device—bits are transferred one at a time from the actual hard disk and assembled together by deserializer electronics inside the controller.

The ST506 gave rise to another similar interface, dubbed the ST412. The primary enhancement offered by this interface was a feature known as *seek buffering*. Unlike ESDI drives, which can process commands to go directly from one nonadjacent track to another, the ST506 can only be told to move one track at a time. Seek buffering speeds up long seeks by providing a buffer for seek commands from the con-

■ **CHOOSING A HARD DISK:** Understanding hard disk interfaces and encoding schemes helps you make an effective choice.

■ **PC MAGNET SAMPLER:** Some topics puzzle almost all of us—and these often turn up on PC MagNet. Here are the answers to a couple of frequently asked questions.

troller, allowing the drive to step its head across the drive platter in one continuous move rather than in a series of discrete moves.

Most ST506 hard disks use an encoding scheme known as *modified frequency modulation* (MFM) to store data. MFM is an outgrowth of an earlier encoding scheme known as *frequency modulation* (FM). The FM scheme represents a binary 1 by a flux change in the magnetic surface on a hard disk (interpreted as a *pulse* by the drive head that hovers over a spinning platter) and 0 by the absence of a flux change (interpreted as *no pulse*). In other words, an FM controller interprets a pulse from the drive head as a binary 1 and the lack of a pulse as a binary 0. To prevent the tolerance on the platter's rate of rotation from having to be impossibly precise, FM encoders place a clock pulse in front of every binary 1 and 0 to signal the controller that another bit is about to pass under the drive head. Thus FM encoding requires two pulses to record a 1 and one pulse to record a 0—or three pulses to record 2 bits (a 1 and a 0). In a data stream with an even distribution of 1s and 0s, for example, this would yield an average pulse-to-bit ratio of 1.5 to 1.

One factor that limits how much data

can be stored on a magnetic surface is how closely these flux transitions, or pulses, can be packed together. It follows that the smaller the number of pulses it takes to represent a unit of data (and the greater the number of "no pulses" that can be put *between* pulses so that the pulses may be spread apart on the recording surface), the more densely the data can be recorded. That's the idea behind MFM encoding. MFM improves on the FM encoding scheme by doing away with clock pulses and representing a 1 as no pulse followed by a pulse and a 0 as either a pulse followed by a no pulse (if the previous bit was a 0) or two no pulses (if the previous bit was a 1).

While the benefits of this type of representation may not be obvious at first, the key is that MFM encoding allows bits to be packed together more tightly by guaranteeing that two pulses will never occur in succession. Figure 1 shows why. A 1 followed by a 0 is encoded as no pulse-pulse-no pulse-no pulse. A 0 preceded by a 0 is encoded either as no pulse-no pulse-pulse-no pulse or pulse-no pulse-pulse-no pulse, depending on what preceded the first 0. No matter what sequence of 1s and 0s you try, you'll never find one that pairs two pulses side-by-side. The net result is an average pulse-to-bit ratio of .75 to 1, and a twofold improvement over the FM encoding scheme.

MFM hard disks are typically formatted with 17 sectors per track. On a hard disk with 512 bytes per sector spinning at the rate of 3,600 rpm, slightly more than 4 million bits pass under the drive head each second (not including information stored in the sector headers that precede each sector). Because the ST506 was designed to transfer about 5 million bits of information per second, ST506 controllers and MFM-encoded hard disks are a match made in heaven. It was no coincidence that IBM chose exactly this combination of drive hardware for its XT- and AT-class PCs of the early 1980s.

The approach that MFM takes to stor-

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ing data can be summed up by saying that it limits minimum and maximum run lengths—the number of no pulses that occur between consecutive pulses. In the MFM scheme, there is never fewer than one and never more than three no pulses separating adjacent pulses. The benefit is twofold: a minimum run length of one al-

bit quantities are carefully structured to guarantee that no fewer than 2 and no more than 7 no pulses will ever fall between two consecutive pulses, resulting in an even higher potential recording density. Odd as it may sound, it works, and it produces an average pulse-to-bit ratio of 0.5:1—50 percent better than MFM encoding. In fact, simply replacing an existing MFM controller with an RLL controller will increase the capacity of a hard disk by 50 percent, allowing up to 26 sectors to be

offers double the capacity of an MFM hard disk. It guarantees that no fewer than 3 and no more than 9 no pulses will ever occur between pulses. However, no matter which data encoding scheme is used, you're still packing 50 percent more information on an RLL disk than on an ST506.

The larger storage potential of RLL encoding is more demanding on the hard disk. RLL disks need higher-quality coatings than conventional MFM disks—a detail you should be aware of when shopping for a hard disk and controller.

The next most popular hard disk interface is ESDI (enhanced small device interface). Functionally, ESDI is similar to ST506, except that it's good for a nominal throughput of about 10 megabits per second (more in special configurations) compared with the ST506's 5 Mbps. An ESDI hard disk spins at the same 3,600 rpm rate as an ST506 hard disk but packs in more sectors per track (ranging from 34 on most ESDI drives to more than 60 on some), enabling more data to pass under the head in a given time interval.

Most ESDI controllers use 1,7 RLL or 2,7 RLL encoding to write data to the hard disk. Electrically, ESDI controllers and ST506 controllers are similar, even to the extent that they use identical 34-pin control cables and 20-pin data cables. The signals passed through the pins, however, are very different. You can't plug an ESDI drive into an ST506 controller and expect it to work—or vice versa.

ESDI drives are more intelligent than their ST506 counterparts. Defect maps are stored on the drives themselves, so you don't have to supply defect information manually. ESDI drives also supply information to the controller defining how many heads, sectors, and cylinders they have, as opposed to ST506 drives, which require that configuration information be stored externally—usually in ROM on the controller itself or in the host PC's CMOS RAM. Furthermore, control signals passed between drive and controller in ESDI systems are more sophisticated than in ST506 configurations. Together, these enhancements add up to higher performance and greater operator convenience.

The third hard disk interface, SCSI (small computer system interface) operates at a much higher level than the ST506 or ESDI. With a SCSI drive, all the intelligence housed in the controllers on ST506 and ESDI systems is in control electronics on the drive itself. The card you plug into your PC isn't really a controller at all, but a

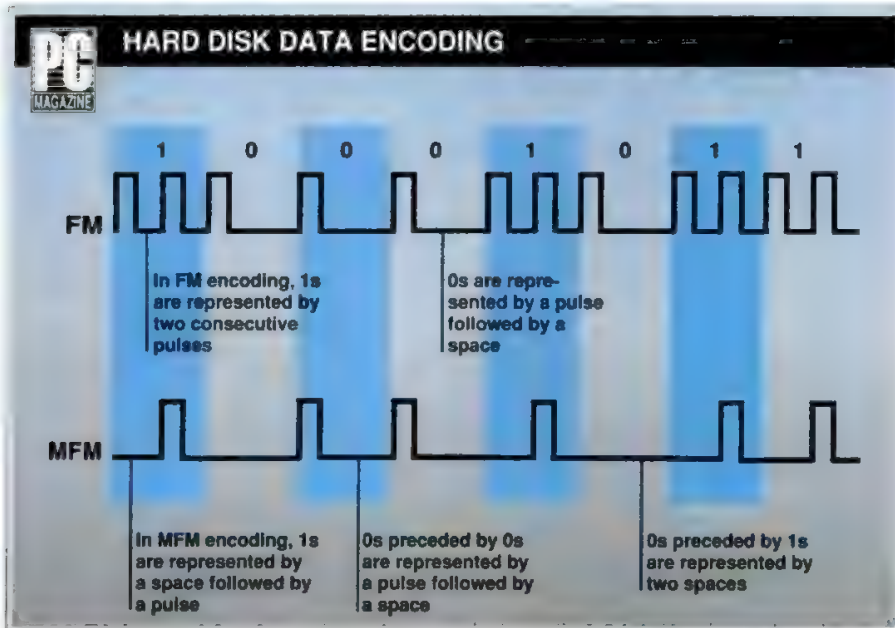


Figure 1: This is the bit pattern 10001011 (decimal 139), shown encoded in FM (frequency modulation) and MFM (modified frequency modulation) formats. FM encoding requires 12 pulses to represent the data, while MFM requires only 6. By reducing the number of pulses required to represent the data and simultaneously ensuring that at least one space and no more than three spaces will ever separate consecutive pulses, MFM permits hard disk data to be recorded at higher densities. RLL (run length limited) encoding takes this idea one step further by spreading pulses out even more.

lows pulses to be spaced closer together; a maximum run length of three eliminates the need for clock bits, because the drive head will never endure more than three no pulses without encountering a flux transition. As a result, we can say that MFM encoding is self-clocking. The method is alternatively referred to as 1,3 run length limited encoding, or 1,3 RLL, with the 1 and 3 specifying the minimum and maximum run lengths.

Another popular encoding scheme is 2,7 RLL, usually referred to simply as RLL. 2,7 RLL takes the idea of intelligent encoding one step further by encoding 2-bit quantities as 4-bit values. It seems at first that this would only increase the amount of storage space needed. But the 4-

squeezed onto each track as opposed to 17 with an MFM drive.

Exactly how RLL controllers translate bit patterns into flux transitions is too complex to go into here. But the logic is analogous to that used in MFM encoding. MFM controllers step through a decision tree to determine whether to represent a 0 as two no pulses or as a pulse followed by a no pulse. Similarly, RLL controllers use conditional logic to decide how to represent the bit patterns 0-0, 0-1, 1-0, and 1-1 and at the same time ensure that the 2,7 run length rule is enforced.

Other RLL encoding schemes deliver even higher data densities. 3,9 RLL encoding, sometimes called ARLL (advanced RLL) or ERLL (enhanced RLL),

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host adapter that converts signals from the SCSI interface into a format compatible with the bus of the host PC.

SCSI boasts superior theoretical transfer speeds resulting in part from an 8-bit-wide data path that allows data to be moved in parallel. Although today's SCSI drives are frequently matched or exceeded in performance by ESDI drives, newer SCSI specifications provide for 16 and even 32-bit data paths, supporting data transfers in excess of 80 megabits per second. Moreover, since SCSI is a system-level interface rather than a device-level interface, up to eight SCSI devices, ranging from hard disks to tape drives to CD-ROM drives, can be daisy-chained from a single host adapter.

So which should you choose for your system? If you're shopping for something in the neighborhood of 40MB or less, go with the ST506-type controller and an MFM drive. The combination of low cost and modest performance is hard to beat, especially for XT and AT clones. If your needs lean more toward 60MB than 40, consider buying an RLL drive and controller. Just be sure that the drive you buy is certified for RLL encoding; some MFM drives are not, and attempting to use them with the more-demanding RLL format may result in data loss down the road.

Because of their higher overall data throughputs, higher capacities, and lower overall access times, ESDI drives and controllers are popular buys for high-performance systems. If you have a 386, an ESDI drive is the logical choice unless you simply don't need the higher capacity that ESDI drives afford. SCSI is a good choice if you want to attach more mass storage devices to your system than your PC has slots—something you may want to consider if you're buying a hard disk for a LAN server.

If speed is really your game, consider investing in a caching disk controller. Caching controllers, available in MFM, RLL, ESDI, and SCSI models, blow away conventional data transfer speeds by storing hard disk data in RAM caches on the controller. In much the same way that static RAM caches speed memory accesses by storing the most-recently used data in fast static RAM, caching controllers speed hard disk accesses by storing hard disk data in RAM on the controller, reducing

the number of physical hard disk accesses. PC Labs tests found that caching controllers can boost hard disk performance by a factor of ten compared with non-caching controllers; for a full review, see "Caching Controllers: Hard Disk Access in No Time Flat" in the June 12, 1990, issue of *PC Magazine*.

SCSI boasts superior
transfer speeds
resulting in part from
an 8-bit-wide data path.

PC MAGNET SAMPLER

If you've followed the discussions in the Tips and Utilities forum on PC MagNet lately, you've seen one question asked repeatedly: "I wrote to a low-density 5¼-inch diskette in my high-density drive, and now I can't read it in my low-density drive. Can you explain why?"

The simple answer to this question is that high-density drive heads are only about half as wide as low-density drive

heads (remember, high-density drives have to lay down 80 tracks in the same space low-density drives lay down 40) and they write correspondingly narrower bands of data to the surface of the disk—bands that sometimes can't be read back accurately by low-density drives' wider, less-precise read/write heads.

Read errors are particularly likely to occur when a low-density drive attempts to read a track that once contained data written by a low-density drive, but has since been overwritten by a high-density drive. The high-density head can't quite cover the track laid down by the low-density head, as shown in Figure 2. The low-density drive's wider head may pick up false signals from the fringes of the narrow track written by the high-density head, producing read errors.

As if to refute this description, many, many users swap disks in and out of low- and high-density drives on a routine basis without ever encountering a problem. But to avoid trouble it's best not to mix write operations: once a disk is formatted (preferably in a low-density drive), write to it only in low-density drives or only in high-density drives, but not in both. You *can* read the disk in either type of drive without causing harm.

Another question that came up recently concerned the length of parallel printer ca-

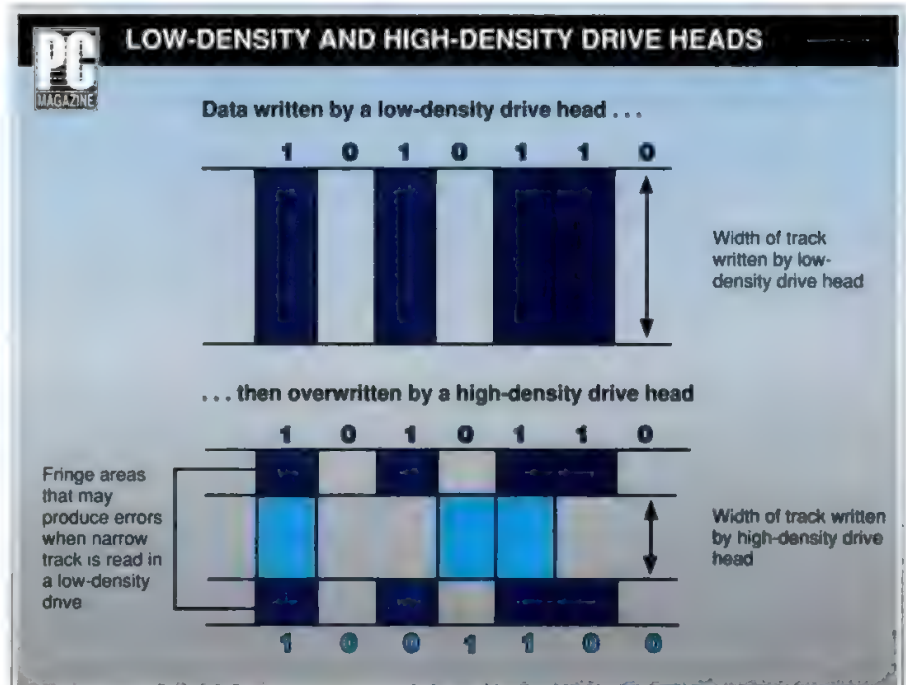
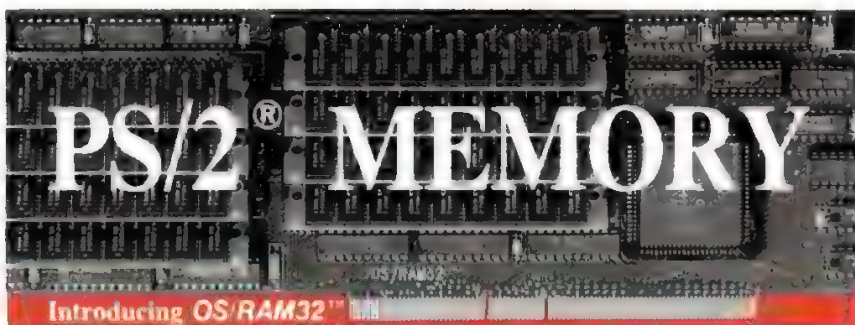


Figure 2: The track laid down by a high-density drive's read/write head is about half as wide as a track written by a low-density drive head. When reading data written by the narrower head, the wider low-density head may pick up false signals on the fringe of the track, producing read errors.



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CIRCLE 128 ON READER SERVICE CARD

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bles. Specifically, why do many printer manufacturers recommend that such cables be no more than 6 to 10 feet long?

There's a good reason for this. Parallel printer cables simultaneously transfer 8 bits of data plus an assortment of control signals in parallel over wires bundled close together. As the length of a cable increases, signal leakage between the wires also increases, leading to faulty readings at the other end. The easiest and least expensive way to reduce leakage is to keep the

The easiest way to
reduce signal leakage
and avoid faulty
readings is to keep the
length of your printer
cable down.

length of the cable down. The 6-foot printer cable has proven to be effective in this regard.

If you haven't signed on to PC MagNet yet, you're missing out. It's a great channel for communicating your questions directly to *PC Magazine* editors and columnists. If you have a question for Tutor, go to the Tutor section of the Utilities/Tips forum and leave a message addressed to 72241.44. That's me. Very often, your question will be answered within a few hours either by me or by one of the several editors and readers who peruse the forum regularly. See you there!

ASK THE TUTOR

The Tutor solves practical problems and explains techniques for using your hardware and software more productively. Questions about DOS and systems in general are answered here. To have your questions answered, write to Tutor, *PC Magazine*, One Park Avenue, New York, NY 10016, or upload them to PC MagNet (see the "By Modem" sidebar in the Utilities column). We regret that we are unable to answer questions individually. ■

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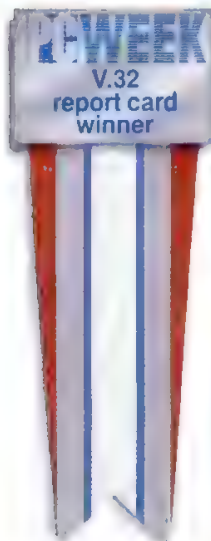
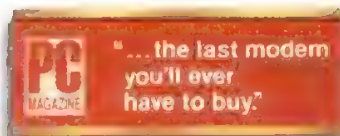


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CIRCLE 367 ON READER SERVICE CARD



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by
Frank J. Derfler, Jr.

Connectivity

MICRO CHANNEL ADAPTERS

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Charles Fieldman
Cleveland, Ohio



I'm not surprised that you're happy with ARCnet. Network administrators in many organizations praise its reliability and performance. If Datapoint had been more interested in making ARCnet an IEEE standard, Ethernet might not be so popular today. Your new PS/2s will love ARCnet too.

As a new manager of Micro Channel PCs, you should get a copy of IBM's publication called "Catalog of Micro Channel Adapters." This catalog carries IBM part number G360-2824-04, and you can get it from any IBM dealer. IBM publishes this document in June and November of each year. Anyone who manages Micro Channel PCs should have a copy.

The catalog lists eleven manufacturers of Micro Channel ARCnet cards. The two best known are Thomas-Conrad ((800) 332-8683) and Standard Microsystems Corp. ((800) 762-4968).

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Scott Jones
Atlanta, Georgia



The relays in the Token-Ring MAU (multistation access unit) connect active stations into the ring. Every station needs to have its own unique connection into the ring, but this doesn't mean that you have to buy an

■ **MICRO CHANNEL ADAPTERS:** An IBM catalog can help you find Micro Channel ARCnet cards.

■ **ADDING ONE MORE NODE:** You don't need to buy another MAU to add more PCs to a Token-Ring LAN.

■ **ADAPTER DIFFICULTIES:** Network adapters using direct memory access are fast—when they work.

■ **INTERPROCESS COMMUNICATIONS:** Named Pipes looms large for station-to-station communications.

eight-port MAU just to add one more node. The fact of the matter is you don't have to buy a MAU at all.

A company called SimWare ((800) 451-3683) markets a product called SAM, for Single-station Access Module, which links PCs over Token-Ring without a MAU. A SAM device looks like a regular Token-Ring cable that swallowed a mouse. The lump in the cable is actually the same type of relay contained in the typical MAU.

You can use SAM cables with regular MAUs in order to add a node by connecting to the OUT port in the MAU. You can even use two SAMs to link two PCs directly for troubleshooting, backups, and any other chores. The capability to combine MAUs and SAMs lets you design a network for economy and efficiency, and according to SimWare the cost of using eight SAMs is less than the cost of a single eight-port MAU.

ADAPTER DIFFICULTIES

I've tried using several different good quality Ethernet adapters in the local area networks I install, but I often get mixed results. Some adapters work in some PCs without errors, but not in others. Some adapters work well most of the time, but die during certain tasks. I can't seem to find a pattern. The adapter manufacturers say that the problem is bus speed, while the PC clone companies usually try to solve the problem with new BIOS chips. Can you help find a solution to this problem?

William Logan
San Francisco, California



H. S. Hardy of Zytec in Dallas, Texas, identified the most likely source of your problems. Zytec makes a variety of network adapters and has a lot of experience with bus interface problems.

Your adapter boards probably use direct memory access to move data to RAM. DMA provides a fast way to move data that doesn't create turmoil with other internal PC functions. But designers differ in how they implement DMA, and those differences can create problems.

The original IBM PC AT and many similar machines used two separate chips for the interrupt and DMA controllers. The adapter boards could fire sequential signals to both chips and get a quick response. But many newer designs put the interrupt and DMA controllers on the same VLSI chip set. In this case, adapter board designers must give the chip set time to recover between signals. It's possible for the PC manufacturers to avoid this problem by putting a delay loop in the BIOS. This is an old problem, but it still pops up now and again, as new adapters and new PCs enter the market.

For example, it seems that many new 386SX computers run their DMA channels at 2 MHz instead of the 4 MHz that's used in the PC AT. This arrangement works with some LAN adapters in some situations, but when you try a task such as

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Connectivity

copying a file from a network server through a network card using DMA to a floppy disk also using DMA, you're going to have a problem. Either the LAN card or your floppy drive will quit, and your LAN will probably get the blame. Unfortunately, upgrading ROMs or changing brands of adapter cards are the only solutions to such problems.

INTERPROCESS COMMUNICATIONS

We have a new network application under development, but we want to avoid being tied to any specific LAN operating system. Should we test for IPX and NetBIOS and use appropriate drivers for whatever is present? Or do you think we should use Named Pipes instead?

Barry Dinsmore
Latham, New York



The real question here is, What is the best technique for passing messages between nodes on a network? Application programs use the NetBIOS interface, which is available in many LAN operating systems, and Novell's IPX/SPX interface to send packets between nodes. Fax and SNA gateways, CD-ROM sharing programs, and even electronic mail programs all address NetBIOS or IPX/SPX with requests for network transportation.

Some networked applications, such as *Close-Up LAN*, test for the presence of IPX or NetBIOS and load the appropriate driver software for the environment. If you develop in C or in assembler, this isn't difficult to do.

However, both Novell and Microsoft recently sang from the same sheet of music by declaring that *Named Pipes* is the best technique for *interprocess communications*, that is, for application programs to move data between different PCs on a network. Named Pipes is a high-level programming interface designed for interprocess communications. It's easy for programmers to use, and compatibility between implementations of Named Pipes and the programs that use it shouldn't be a problem. Novell and Microsoft now provide Named Pipes interfaces on both DOS and OS/2 client PCs.

In *NetWare*, for example, you load another piece of software called DOSNP

.EXE along with the IPX.COM driver and NET3.COM *NetWare* redirector.

While Named Pipes seems destined to become a standard, it has one thing in common with a lot of other software that is trying to meet standards: it's slow. Our experiments in the *PC Magazine* LAN Labs demonstrate that we can move packets much faster by addressing IPX or NetBIOS than we can with Named Pipes, but in large part the speed of transmission depends on the size of the data blocks the application uses.

Named Pipes programs are capable of moving up to 64K of data in a single call. Programs using other transport mechanisms have to do a lot more work to move that much data. However, many applications will never need to move blocks of data as large as 64K.

For example, speed isn't important to programs like electronic mail packages, so they'll get adequate service from Named Pipes, regardless of how someone writes the programs. But if you're developing applications that use a lot of graphics or database records, you'd better use data retrieval techniques that deliver large blocks of

**Novell and Microsoft
both declare that
Named Pipes is the
best for interprocess
communications.**

data so that Named Pipes can move them efficiently. Otherwise, I'd consider using lower-level protocols to get the speed they provide, regardless of problems of potential incompatibility.

NETWORK YOUR QUESTIONS

Connectivity gives you practical solutions to networking problems of all types. We'll pay \$50 for any tips we print. Please submit your letter on a disk along with a print-out. Then mail your contributions to Connectivity, *PC Magazine*, One Park Avenue, New York, NY 10016, or you may contact Frank J. Derfler, Jr., via MCI Mail (be sure to use Derfler's box named PC MAGAZINE LAN LABS). We are unable to answer letters individually. ■

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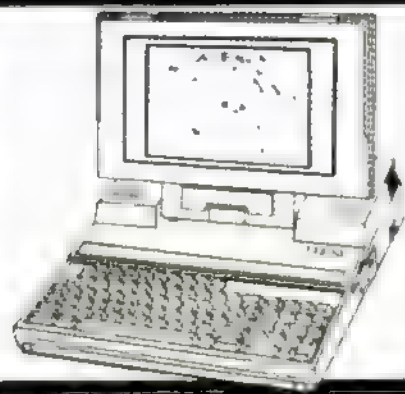
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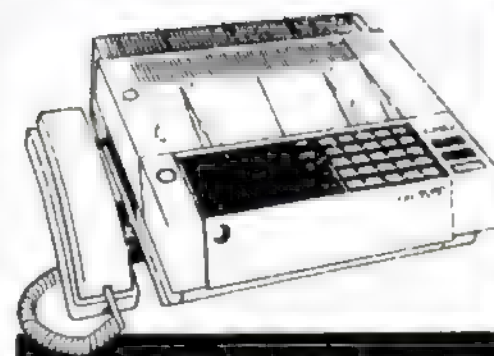
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INTEL - 80287: 8/10 MHz 187/207

80387: 16 / 20 MHz 317/357

80387: 25 / 33 MHz 447/547

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- 90 Day Mr. Warranty!
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- 100% IBM compatible
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- 40 MB hard disk drive.
- 1.44MB 3.5" floppy disk drive.
- Desktop expansion module; converts laptop into desktop computer.
- 2400 bps Hayes compatible modem with two phone jack connectors.
- Two 16-bit AT expansion slots & one XT slot.
- Two RS232C serial ports.
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- Detachable LCD display & 101 key keyboard.
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- MS-DOS 4.0.



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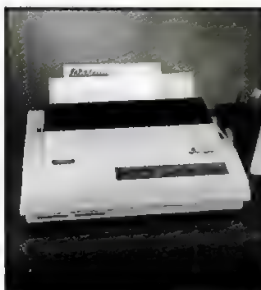
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- ✓ Standard chassis with keylock, speed and reset buttons. (Optional chassis add \$50)
- ✓ 200 watt power supply
- ✓ Monochrome monitor with monochrome graphic board.
- ✓ Clock/calendar, parallel port, and two serial ports.
- ✓ Keytronics 101 key enhanced keyboard.
- ✓ 8 expansion slots and 5 drive bays.
- ✓ Phoenix BIOS.
- ✓ Compatible with DOS, OS/2, Windows, Xenix and Novell.

Combine the benefits of an advanced Intel 386 processor, the value of a 286 and the advantages of FastData and you've got the FastData 386/SX. This machine is the choice of those who want to run today's powerful 386 and multitasking software, like Windows, and want to rip through their favorite programs, like Lotus and Word-Perfect at blinding speeds. This machine is ideal to run the latest business, educational, and graphics software right out of the box. We've made it for customers, from the option stationer, to those who want the best in graphics of money's worth, performance, 4-megabyte disk, and 16 bit color VGA. Compare performance, features and service and you will find no better 386 value. FastData 386/SX. The FastData 386/SX has 90 days warranty to be happy. Fast is a great word.

System Price	40mb	65mb	80mb	100mb
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VGA Color	\$1,799	\$1,999	\$2,199	\$2,399
VGA 1024	\$2,199	\$2,399	\$2,599	\$2,799



FastData 386/25

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Standard Features

- ✓ 25mhz Intel 80386 processor.
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- ✓ Monochrome monitor with monochrome graphic board.
- ✓ 200 watt power supply.
- ✓ Clock/calendar, parallel port, and two serial ports.
- ✓ Keytronics 101 key enhanced keyboard.
- ✓ 8 expansion slots and 5 drive bays.
- ✓ Phoenix BIOS.
- ✓ FCC Class B approved.

The optimum combination of features, expandability, and power make the FastData 386/25 an ideal choice for those whose applications demand the most from a computer. Whether running as a network file server, CAD or graphics station, or power user's workhorse, the FastData 386/25 handsly meets the challenge. It comes configured with a whopping four megabytes of fast RAM, a superfast 22 millisecond 65 megabyte hard disk, and maximum VGA displaying 1024 by 768 resolution powered by a high-output 16 bit \$12K VGA board. Plus the FastData team will configure your FastData 386 exactly the way you want, without sending you shopping elsewhere. When evaluating 386-DX workstations, why even consider anything else?

System Price	65mb	80mb	100mb	200mb
Monochrome	\$2,299	\$2,499	\$2,699	\$2,899
VGA Color	\$2,499	\$2,699	\$2,899	\$3,099
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FastData 286/12

\$899

Standard Features

- ✓ 12mhz 80286 processor.
- ✓ 1 megabyte of zero wait-state RAM.
- ✓ 40 mb 28ms hard disk 1:1 interleave.
- ✓ 1.2mb 5.25" or 1.44mb 3.5" floppy drive (2nd drive add \$79).
- ✓ Standard chassis with keylock, speed and reset buttons. (Optional chassis add \$50)
- ✓ 8 expansion slots and 5 drive bays.
- ✓ 200 watt power supply.
- ✓ Monochrome monitor with monochrome graphic board.
- ✓ Clock/calendar, parallel port, and two serial ports.
- ✓ Keytronics 101 key enhanced keyboard.
- ✓ Phoenix BIOS.
- ✓ FCC Class B approved.

Imagine a fast 286 computer at a super price and you've got the FastData 286/12. This system is complete, not stripped. You get one megabyte of zero wait-state memory and a 28ms IDE hard disk - standard. Also included is an amber monitor and graphics card, your choice of a high density 1.2mb or 1.44mb floppy drive and a Keytronics keyboard. And since it's a FastData, you are backed with toll-free technical support, one year warranty with the FastShip replacement program & on-site service plan, and our 30 day full money back satisfaction guarantee!

System Price	40mb	65mb	80mb	100mb
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You get more out of your FastData personal computer because we put more into it. We've been building PCs longer than most of the competition and we put that experience to work for you. We use proven designs that pass our stringent performance requirements and compatibility standards so it will be sure to pass yours.

Better Components

FastData systems use some of the best parts in the industry. For example, each FastData system ships with a Keytronics keyboard. Keytronics costs a lot more than others, but the quality is worth it. Standard equipment includes quality components from Toshiba Western Digital, Phoenix and other industry leaders.

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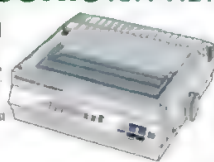
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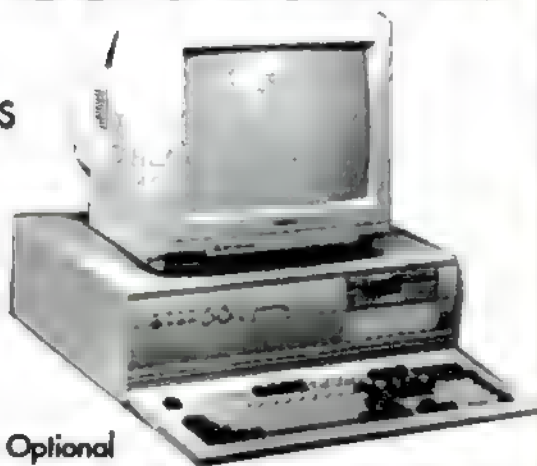
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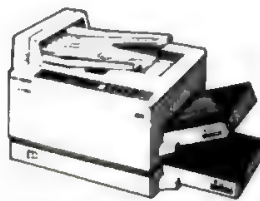


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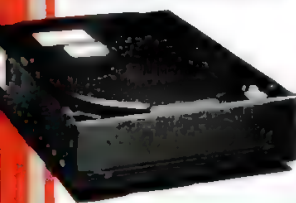
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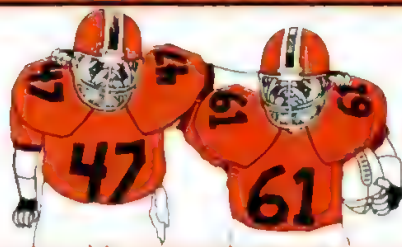
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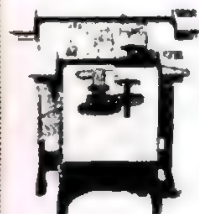
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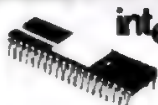
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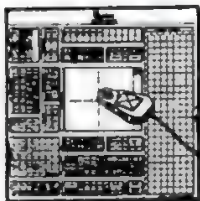
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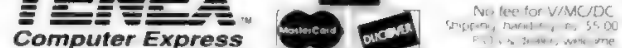
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1. Do you work in a DP/MIS department?

01. ☐ Yes 02. ☐ No

2. Please indicate your company or organization's primary business activity: (Check one only.)

01. ☐ Manufacturer of Computer Equipment, Computers, Software
 02. ☐ Manufacturer—Aerospace
 03. ☐ Manufacturer—Other
 04. ☐ Systems House
 05. ☐ Computer Consultant
 06. ☐ Computer Retailer/VAR/VAD Distributor
 07. ☐ Communications
 08. ☐ Finance/Banking/Insurance/Real Estate/Accounting
 09. ☐ Education
 10. ☐ Government—Federal
 11. ☐ Government—Non-Federal
 12. ☐ Research and Development
 13. ☐ Data Processing/Computer Service
 14. ☐ Health/Medical/Legal Service
 15. ☐ Engineering/Architecture
 16. ☐ Agriculture/Construction/Mining/Oil/Transportation/Utilities

3. Please indicate your primary business function: (Check one only.)

01. ☐ DP/MIS
 02. ☐ Systems, Programming
 03. ☐ Communications
 04. ☐ Engineering
 05. ☐ Res./Dev./Scientific
 06. ☐ Accounting/Finance
 07. ☐ Computer Consulting
 08. ☐ Purchasing
 09. ☐ Operations
 10. ☐ Production
 11. ☐ Education/Training
 12. ☐ Marketing/Sales
 13. ☐ Medical/Legal
 14. ☐ Admin./Mgmt.
 99. ☐ Other

4. Is your company a reseller?

01. ☐ Yes
 02. ☐ No

5. For how many IBM PCs and compatibles do you specify brands of products:

01. ☐ 10 or less
 02. ☐ 11-25
 03. ☐ 26-99
 04. ☐ 100 or more

6. Are there any PCs in your office?

- (Check all that apply.)
 01. ☐ Linked to mainframe
 02. ☐ Linked to mini
 03. ☐ Networked together
 7. Please check the equipment currently installed at your location: (Check all that apply.)
 01. ☐ IBM or Compatible PCs
 02. ☐ IBM or Compatible Mainframes
 03. ☐ IBM or Compatible Minis
 04. ☐ Macintosh

8. Do you plan to buy any PC Products?

01. ☐ Now
 02. ☐ In 4 to 6 months
 03. ☐ In 7 to 12 months
 04. ☐ No definite plans
 Please print

Name _____

Title _____

Company _____

Address _____

City _____

9. Number of Employees in your entire company:

01. ☐ 25 or less 03. ☐ 100-499
 02. ☐ 26-99 04. ☐ 500-999
 05. ☐ 1000 or more

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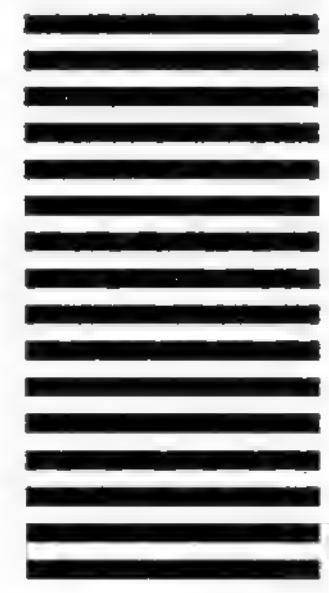
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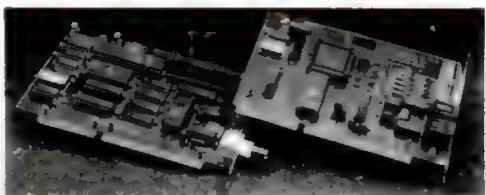
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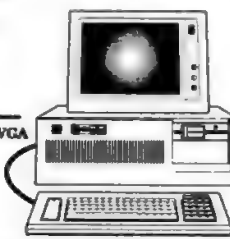
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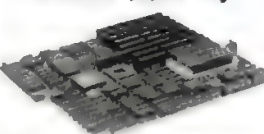
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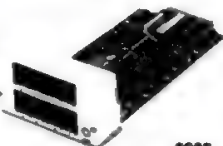
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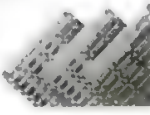


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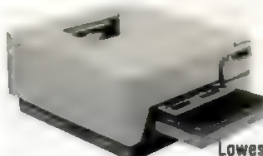
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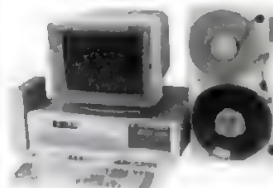
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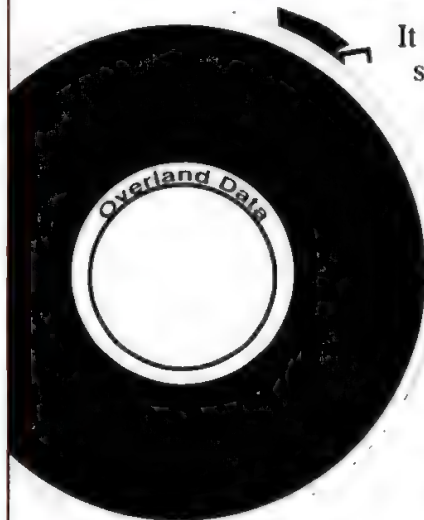
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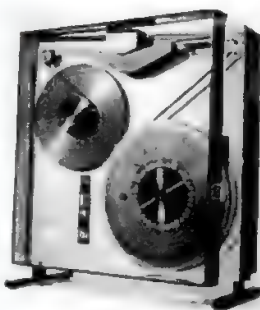
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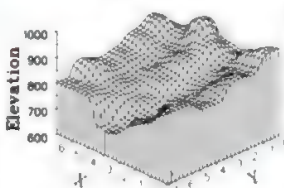
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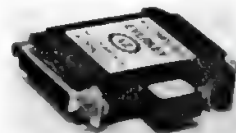


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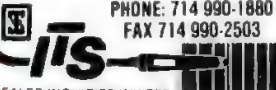
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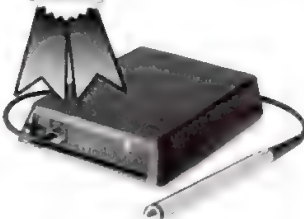
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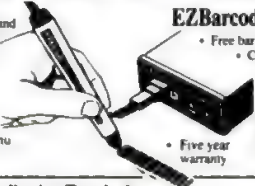
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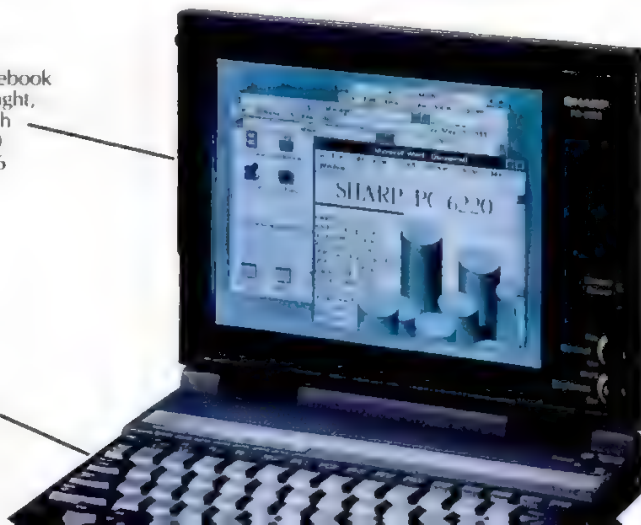
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VGA DISPLAY.

The first in a notebook computer. It's bright, paper-white, with a crisp 640 x 480 resolution and 16 shades of gray.

TRUE NOTEBOOK SIZE.

8.5" x 11" x 1.4",
4.4 lbs



THE PC-6220.

About the only thing you *don't* get with the Sharp PC-6220 is another piece of luggage to carry. It's a mere 8½" x 11" and weighs only 4.4 lbs., yet has the kind of power you need. To run Windows.™ To do desktop publishing. To have instant access to your programs and files.

Find out how you can put a serious computer in

After Hours

Products for the Leisure Side of Personal Computing

Accolade's *HardBall II* Has More Options, Better Play

GAMES
by Don Trivette

Take me out to the ball game? Well, maybe not, now that Accolade has introduced *HardBall*

II, an improved version of its popular baseball game. In addition to better graphics, *HB II* gives you more options and choices of play than you can shake a bat at.



HardBall II's "manager menu" lets you choose from a variety of viewing perspectives.

First of all, you get to choose a team from a roster that would make a league president drool. The clubs are fictitious (probably because Accolade didn't pay licensing fees) and bear names like New York Apples, Boston Minutemen, and Kansas City Twisters; others are lesser-knowns like the Sandlot Swingers and the Accolade Aces.

HardBall can be played in a variety of configurations, including player versus computer and computer versus computer, but it's more fun when two fans square off against each other. The game has good keyboard controls and also supports optional joysticks. It's a little sluggish on a slow computer unless you switch to the less-colorful CGA mode.

Newer games are beginning to make demands for processing power and graphics that older, less-powerful machines are unable to meet. Plenty of games still run fine on XT's, but others really need the oomph of at least a 286 CPU.

MUSIC
Cakewalk Professional offers serious sequencing power.

The CD-Guide, Optical Edition: A database of music CDs on CD-ROM.

One new feature I really like is the ability to quickly change the infield and outfield positions simply by pressing a hotkey. When a weak player comes to bat, you can bring the outfielders in by pressing the numeric "8" key, or try to set up a double play by covering the bases with the "3" key. For the frustrated coach who doesn't like the default settings, there's a design-your-own fielding option.

The manager's menu controls things like view (full field, pitcher, or batter), and level of

CONTINUES

Sporting News CD-ROM Is Just the Thing for Baseball Stat Fiends

by Don Trivette

Founded in 1886, *The Sporting News* is widely known as the Bible of Baseball (although it began covering other sports in 1942). In addition to the weekly edition, it publishes two annuals called *The Official Baseball Guide* and *The Official Baseball Register*.

The *Guide* is a year-by-year team summary and compilation of baseball news, while the *Register* has the current and lifetime statistics of all active players in both the major and minor leagues. All of this information is now available on a CD-ROM published by Quanta Press (St. Paul, Minn., (612) 641-0714).

The CD-ROM is divided into eight databases: six Baseball Guides for 1985 through 1990, the Baseball Register for 1989, and a database called Awards & Records that's actually a summary of facts from the other databases. In addition, there are a thousand high-resolution images of

players, managers, and owners available on computers with VGA monitors.

The search engine for these databases makes retrieval as easy as entering names and pressing function keys. For example, in order to check out the winner of the 1903 World Series, simply enter "1903" and you will see that the Boston Red Sox beat the Pittsburgh Pirates five out of eight games that year.

Quanta Press says that four major league teams have purchased the product to help them with things like salary negotiations and finding out the answers to historical questions. If you've got \$250 and a CD-ROM player attached to your computer, you too can have *The Sporting News Baseball CD* at your fingertips. If not, perhaps you can visit the Baseball Hall of Fame in Cooperstown, New York, to which IBM and Quanta are donating this equipment and software.



In addition to a trove of baseball stats, *The Sporting News Baseball CD* offers VGA "photos" like this one of the late commissioner Bart Giamatti.

After Hours

Hardball II

CONTINUED

play (pitch speed and ball control). For those hotly contested calls, this menu accesses an instant replay feature that works like a VCR. With slow motion, fast forward, pause, and even a frame advance, it's unlikely there will be any contested calls. The manager's menu also controls substitutions and batting order for both the home and the visiting teams. Best of all, in *these* clubs the manager never gets fired.

If statistics are your game, you'll be pleased to find that *HardBall II* keeps 'em like a computer. The Team Editor lets you "build" a player and enter some stats like doubles, triples, and home runs. Other stats, like batting averages and on-base percentages are automatically calculated. Take care when changing or entering numbers; you'll have a hard time connecting with the ball if your man has a batting average of .0009.

With all of its new features, *HardBall II* can control and set almost everything in the stadium except the composition of the bat and the eyesight of the umpires. Even so, I have more fun leaving the bells and whistles alone and matching the Sandlot Swingers against the Lotsa Losers. It's nice to boil the game down to its simplest elements, especially in this age of autographs for sale, tarnished reputations, and labor strife between players and owners. *HardBall II* can accurately simulate the modern game, but it also captures the timeless quality that draws kids everywhere to pick up bat and glove.

There is one option I do consistently use—it assures that every pitch is across the plate. It makes *HardBall II* a batter's dream.

List Price: *HardBall II*, \$49.95.

Requires: 512K RAM; DOS 2.1 or later; graphics adapter. Copy protected by code wheel. Accolade, 550 S. Winchester Blvd., San Jose, CA 95128; (800) 245-7744.

CIRCLE 405 ON READER SERVICE CARD



Cakewalk Professional's event filter makes it a formidable tool for global editing functions such as quantization.

Cakewalk Pro Sports High-End Power, Low Price



Several years ago, Twelve Tone Systems' *Cakewalk* garnered a *PC Magazine* Editor's Choice as a flexible but inexpensive alternative to higher priced sequencers. *Cakewalk Professional*, recently introduced by Twelve Tone, competes head to head with the market's heavyweights. For a reasonable \$249, it provides just about everything the demanding professional musician will need in a sequencer.

Luckily, all this power doesn't come at the expense of ease of use. Pull-down menus make things simple, while speed keys provide a quicker alternative for common functions. The interface accommodates a mouse very nicely, although one isn't necessary. Detailed context-sensitive help complements excellent documentation.

Recording with *Cakewalk Professional* is extremely flexible. You can punch in or out on any clock tick and adjust the resolution from 48 to an ex-

tremely precise 192 clock ticks per beat. A versatile step record function lets less-proficient players record notes or chords one at a time. And with 256 tracks available, you'll never have to worry about saving too many takes.

During playback it's easy to experiment with changing the channel, pitch, or key velocity of any track. The track looping feature lets you specify the number of loops, giving it much more practical value than the continuous looping found on many sequencers. You can even start a loop at a specific point in the piece.

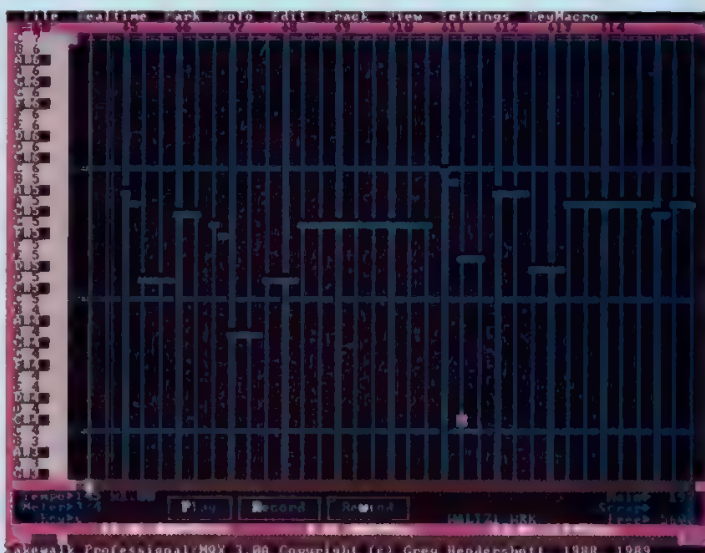
Cakewalk Professional's measures screen gives you a bird's-eye view of many tracks at once, showing each measure as a single character. It makes cutting or pasting large sections (involving any number of tracks) a snap, especially with a mouse for clicking and dragging.

The piano-roll-style note editor also makes good use of the mouse for dragging notes to new locations. You can't alter note durations by dragging, but mnemonic speed keys will change a note to any common value. A pop-up dialog box makes it easy to alter key velocity and MIDI channel or fine-tune timing values for a selected note.

In 25-line display mode, the note editor shows you only a paltry range of about an octave without scrolling. To overcome this limitation, the program supports 43-line EGA mode and 50-line VGA modes, displaying over three octaves in the latter. On the horizontal dimension, a very handy four-level zoom expands or shrinks the bars displayed on screen.

Cakewalk Professional's event editor displays MIDI events as an editable parameter list with one line per note or controller event. To keep

CONTINUES



Cakewalk Professional's piano-roll-style note editor lets you display over three octaves at once in 50-line VGA mode.

After Hours

Cakewalk Pro

CONTINUED

controller events from getting buried in a welter of notes, each event type appears in a different color—one of the nice little touches found throughout the program. You can switch among all editing screens during playback, and each screen scrolls to follow the music.

The package provides the standard features for transposing, inverting, stretching, or shrinking sections, or scaling key velocity for smooth crescendos and diminuendos. You can quantize music, moving everything to the nearest specified note value; this lets you smooth out rhythmic rough spots. An option to adjust the percentage of quantization prevents the music from sounding mechanical.

What makes *Cakewalk Professional* really shine in global editing is its remarkable event filter, which lets you search for notes by specifying ranges of pitches, key velocities, and beats or clock ticks in the bar. There are even wildcard and NOT

options. You can either do a search and replace or use the filter with functions such as cut, transpose, or quantize. The filter's dialog box is not as clear as it could and perhaps should be, but it gives you formidable control over your music.

Do you want to add accents to certain beats of every bar or delete all grace notes shorter than a specified duration? No problem. The filter also lets you selectively split one track into two. For example, you could cut from one track all the notes between C5 and G6 that fall on the second half of a beat—excluding sixteenth notes—and paste them to another track. Recognizing that this much editing power can be dangerous, the program gives you a cyclic undo and a timed autosave to a different filename.

Cakewalk Professional allows control over tempo at the clock-tick level and lets you scale tempos for smooth accelerandos and ritards. You get only a columnar listing of tempo parameters, rather than a more intuitive horizontal graphic display, but editing is nonetheless easy.

Cakewalk Professional also offers a feature that's essential for wedding musical spontane-

ity with notational accuracy, but which is rarely found in sequencers. Rubato—or any other tempo changes during recording—will make the notated result deviate from the sequencer's beat markings in the note editor. *Cakewalk Professional* lets you play the music back and hit a key whenever a beat should fall. The program then renotes the music so the beats line up but compensates by adding tempo changes so the music still sounds the same.

If you can never get enough features, you'll love the *Cakewalk Professional* application language, which lets you write your own editing functions and execute them from a menu. You may find the language's syntax rather arcane, though, unless you're experienced in LISP and C. For simpler tasks, you can record keystroke macros.

The program lets you easily download banks of system-exclusive data, store them with a song, and load them manually or automatically. It also supports MIDI song position pointers, SMPTE, and FSK for synchronization with other MIDI devices and tape. It imports and reads Standard MIDI files, and

it's free of the copy protection that saddles so much music software.

The package has a few minor omissions. For instance, the only way you can make some important configuration settings permanent is to write an AUTOEXEC macro that engages them. It would be nice if some functions—such as sliding material forward or back—understood beats as well as clock ticks.

Cakewalk Professional puts impressive capabilities at your fingertips with a minimum investment of learning time. If this is more power than you need, consider the lower priced *Cakewalk* at \$150. You'll get the same elegant interface and attention to detail without all the bells and whistles.

List Price: *Cakewalk Professional*, Version 3.0, \$249.
Requires: 512K RAM; hard disk; DOS 3.0 or later; graphics adapter; Roland MPU-401, Music Quest MQX, or compatible MIDI interface; separate version for Yamaha C1 computer. Twelve Tone Systems Inc., P.O. Box 760, Watertown, MA 02272-0760; (800) 234-1171.

CIRCLE 406 ON READER SERVICE CARD

CD-Guide Lists Music CDs On A CD-ROM

MUSIC
by Don Trivette

If you've ever spent hours in a crowded music store poring over a Schwann catalog looking for a compact disk, you'll appreciate the new *CD Guide: Optical Edition*. This is the definitive reference guide to music CDs.

Published quarterly on CD-ROM by WGE Publishing of Hancock, New Hampshire, the *Optical Edition* is the electronic counterpart of a paper catalog which is also called the *CD Guide*. Both formats list more than 40,000 audio CDs and 10,000 quality ratings, but the *Optical Edition* also has the full text of 4,000 music reviews and almost an hour's worth of music samples.

The *Optical Edition* software lets you search for CDs by the

name of the composer or artist, by the title of the disk, by the disk number as issued by the record label, or by initiating a full-text search of the database. For each disk there's a description of the selections, and listings of the artists, the disk number, the label, and the musical category. Playing times are also included. Many of the listings for newer disks have a performance and sound rating by the editors of *CD Review* magazine, and separate ratings submitted by the publication's readers.

I entered "Peter & the Wolf" and got a list of 19 disks on 13 labels, one of the highest rated of which was the performance by John Williams and Dudley Moore on the Philips label. But after reading the descriptions, I decided on the one put out by London that includes Dukas'



Each edition of the *CD Guide* includes a small selection of music and cover-art samples from featured disks.

"Sorcerer's Apprentice."

Three large record stores told me it was not in the Schwann catalog and therefore no longer available, but a small record shop checked with a wholesaler and found out that this version of "Peter & the Wolf" is a holiday edition available only from Oc-

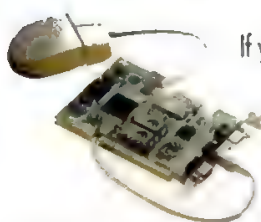
tober through February. I am impressed with the thoroughness of the *CD Guide*'s listings.

CD-ROM players like the Sony 7101, which play stereo music as well as data, let you listen to cuts from the releases featured in each quarterly edi-

CONTINUES



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After Hours

CD Guide

CONTINUED

tion of the *Optical Edition*. For each selection there's a full-color graphic of the CD's cover art, and detailed track, personnel, and production information.

Classical, pop/rock, jazz, and new age are all represented among the musical samples. The Spring edition, for example, included excerpts from Saint-Seans' "Carnival of the Animals," "Happy Birthday Charlie Brown," Elton John's "Goodbye Yellow Brick Road," and "Rio Amazons."

These samples, which sound as good as standard audio CDs, are a seductive form of advertising. After listening to two cuts from "Carnival of the Animals" on the Klavier label, I ordered it from Music New Hampshire, a subsidiary of WGE Publishing. (Incidentally, I was surprised to find that the *CD Guide* disk also plays on my regular CD player.)

The *Optical Edition* also comes with a utility that enables your audio-capable CD-ROM player to play standard audio CDs. The on-screen controls are pretty basic; you can start from any track number, or play a single track, but niceties like track programming and audible search are not included. This feature is a great convenience, nevertheless. You can load up your favorite CD, then exit the program and go back to word processing while your computer keeps your ears happy.

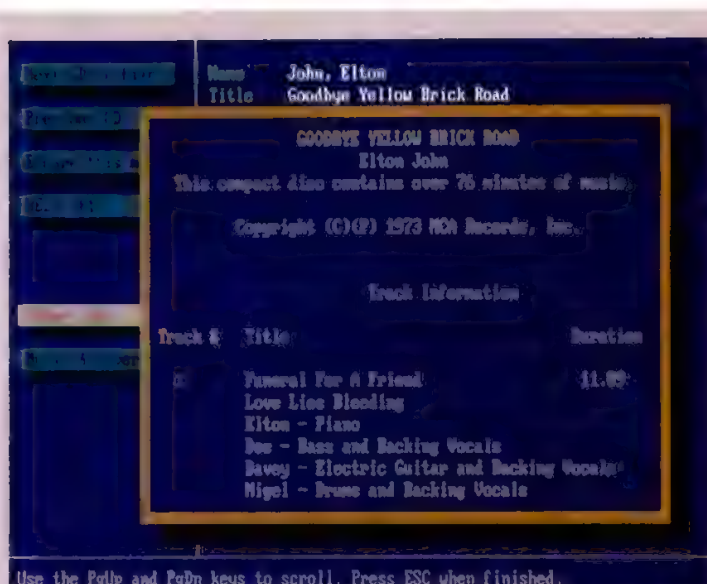
The *CD Guide: Optical Edition* is aimed at retailers, libraries, and serious music buffs and is priced accordingly. A year's subscription (four issues) costs \$259, or you can get a single

issue for \$99.

List Price: *CD Guide: Optical Edition*, \$259. **Requires:** 640K RAM; DOS 2.0 or later; CD-ROM drive with Microsoft Extensions 2.1 graphics

adapter. CD-ROM with audio capability optional. WGE Publishing Inc., Forest Rd., Hancock, NH 03449; (800) 227-1053.

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by
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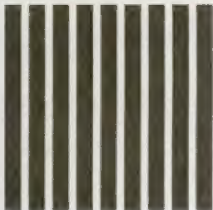
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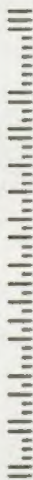


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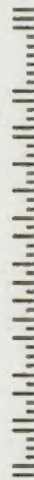


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